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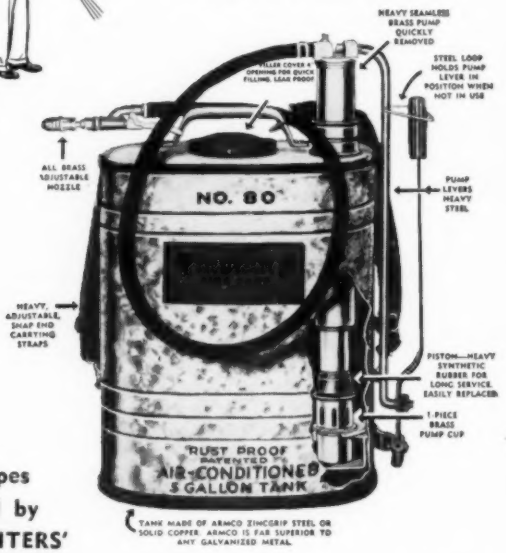
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CONTENTS

COVER: Dogwood in Bloom. *Photo Courtesy U. S. Forest Service.*

Government Social Programs and Forestry *Albert C. Worrell* 179

Control of Sunscald and Subsequent Buprestid Damage in Spanish Cedar Plantations in Yucatan *J. M. Miller, J. P. Perry, Jr., and N. E. Borlaug* 185

Accidents Cost Money *Robert W. McDermid* 189

Problems of Managing Upper Michigan's Coniferous Swamps *Philip L. Thornton* 192

Factors Influencing Streamflow from Two Watersheds in Northeastern Pennsylvania *Howard W. Lull and Herbert C. Storey* 198

Mechanized Thinning in Jack Pine Saplings *R. C. Dosen, J. H. Stoeckeler and F. G. Kilp* 201

Samlping for Height-Diameter Relationships *J. W. Ker and J. H. G. Smith* 205

Consistency of Bud Bursting in Douglas-Fir *William G. Morris, R. R. Silen, and H. Irgens-Moller* 208

Regeneration in the Sandhills *Edwin A. Hebb* 210

The American Society of Range Management *M. J. Reed* 213

Notes 214

Loblolly Pine Not Suited for Bud Pruning; An Improved Device for Planting Tree Seedlings; The Bitterlich Method of Cruising—Why Does It Work?

Points of View 218

Comments on Relationship of Forestry and Land Surveying; Suggestions for Revision of Terminology Dealing with Fire.

Reviews 220

A World Geography of Forest Resources; Rabbits; The Native Trees of Florida; Genetics in Silviculture; Wood Particle Handbook; Silviculture; Water for America; Publications of Interest.

Current Literature 224

Society Affairs 225

Forestry News 247

Index to Advertisers 256

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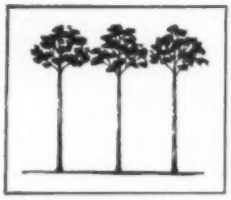

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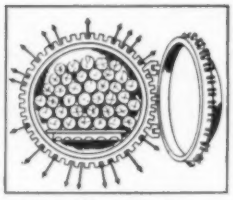

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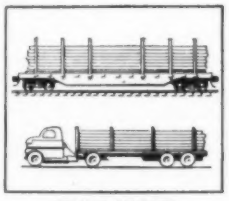

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Government Social Programs and Forestry

Albert C. Worrell
Associate professor of forest economics, Yale University, New Haven, Connecticut

THE FREE WORKING of the market system in the economy of the United States is significantly influenced by government interference in many places. The various programs which aim to insure minimum standards of economic welfare and security are an important part of this governmental influence. These programs affect the forestry segment of our economy, as the businessmen among us well know. But the rank and file of the forestry profession and of people concerned with forestry are generally not well informed about them. My purpose here is to describe briefly four of the government social programs which affect forestry and to raise some questions about the economic implications of these programs.

Among the social ends which our society is trying to achieve through governmental control of private enterprise are: (a) equitable compensation for work, reasonable periods of work, and safe employment of children; (b) adequate incomes for elderly people and the survivors of deceased wage earners; (c) continued incomes for workers during periods of involuntary unemployment, and (d) financial compensation of workers for their losses from accidents on the job and financial support for their survivors if they are killed. The laws which set up these governmental controls are complex and have been revised many times in an effort to make them more effective. Both the federal government and the states have established regulations in these areas and some of them vary from state to state. I will try to paint a general picture of these regulations and to illustrate some of the variations which exist. The effect of the laws on a particular employer depends on his location and circumstances and he may need legal counsel in determining his exact status. I will first describe the general characteristics of these programs and then the exemptions from their provisions which apply to forestry.

The Fair Labor Standards Act

This is a federal law which applies uniformly throughout the United States. Some states have set up higher standards within their own jurisdictions, but the federal law sets a minimum in the others. The law applies only to employees engaged in, or producing goods for, interstate commerce. However, the employer does not have to ship his goods directly in interstate commerce, they may leave the state through another firm. And workers may be covered if they produce something which becomes a part of goods shipped in interstate commerce by another firm or are engaged in a closely related process or occupation directly essential to the production of such goods.

The Fair Labor Standards Act does three things: (a) it sets a minimum hourly wage rate, (b) it specifies the rate of pay for overtime work, and (c) it restricts the use of child labor. The minimum wage rate has gradually been increased by amendments to the original act of 1938. Since March 1, 1956 it has been set at $1.00 per hour and it can be raised by future amendments to the act. The overtime provision of the law specifies payment at one and one-half times the employee's regular rate for all hours over 40 in any one workweek. The law does not set any limit on the number of hours a person 16 years old or older may work in any one week and it does not specify extra pay for Saturday, Sunday or holiday work as such. All it says is that a person who works more than 40 hours in any one week must be paid at a rate of 1½ times his *regular rate* for each hour he works in excess of 40. This provision applies to salaried workers and to those paid on a piece rate basis as well as to regular hourly employees.

The child labor provision prohibits any employment whatever of a child under 14 years of age. It effectively restricts the employment of children under 16 to office and sales jobs when school is not in session, with limits on the number of hours and time at which they may work. It prohibits the employment of minors under 18 in hazardous occupations, which specifically include: (a) work as a motor vehicle driver or helper, (b) work on logging jobs and in the operation of any sawmill, lath mill, shingle mill, or cooperage stock mill, (c) jobs involving operating power-driven woodworking machines. For all practical purposes, the law restricts employment in most forestry operation to persons 18 years old or older.

Old Age and Survivors Insurance

This also is a federal law which applies uniformly throughout the United States and is commonly known as "social security." It is intended to provide income for workers after they attain retirement age and to provide support for dependents who survive after a worker's death. This is an insurance plan financed by taxes on both employees and employers. At present practically everyone who

works as an employee is covered.

The tax is based on wages earned by the employee. As the law now stands, earnings in excess of $4200 in any one year are not taxed. The employer and the employee each pay a tax of 2 percent[1] of the employee's taxable wages and the employer is responsible for collecting the employee's share of the tax. The employer may pay the employee's tax himself, and not deduct it from the employee's wages. If he does this, the employee's tax is not considered a part of the total wages in computing the employer's 2 percent tax. "Wages" include all cash payments and also remuneration paid in any other medium. The present 2 percent rate has been in effect since 1954. Unless Congress changes the law this rate will increase automatically to 2½ percent in 1960, 3 percent in 1965, 3½ percent in 1970, and 4 percent in 1975. Thereafter the rate will remain at 4 percent.

Unemployment Insurance

Unemployment insurance is a joint federal-state program in the United States. It is administered by the individual states in accordance with their own laws. The federal government pays all the actual administrative costs, so the state taxes go entirely into insurance. Details of the acts vary considerably from state to state but the basic characteristics are uniform throughout the country.

The insurance program is based on the Federal Unemployment Tax Act which levies a tax of 3 percent on the wages and salaries paid by an employer. The act defines an "employer" as any person or firm employing 4 or more different individuals on any 20 days, each of which is in a different calendar week of the taxable year. The tax is not levied on that part of a worker's wage which exceeds $3000 per year from one employer. Practically all forestry employers are subject to the federal tax except the very small firms and those conducting a seasonal business which lasts less than 20 weeks in a year. An employer may deduct from his federal unemployment tax the amount which he actually pays to a state under a state unemployment compensation act. The maximum amount which he may deduct, however, is 90 percent of his federal tax. This means that regardless of how much he pays in state tax he must pay a federal tax of at least 0.3 percent of his covered payroll.

Because of this provision of the federal law, the standard tax rate under all state laws is 2.7 percent (that is, 90 percent of the federal tax). Most states follow the federal law and tax only the first $3000 of a worker's annual salary but four states tax the first $3600. The cash value of remuneration paid in any medium other than cash is considered a part of taxable wages. Only Alabama, Alaska, and New Jersey require employees also to contribute to the unemployment insurance fund. In these states the employer is responsible for deducting the employee's tax and sending it in with his own.

Twenty-eight states limit coverage to firms employing 4 or more workers. Four states cover firms with 3 workers, one state those with 2 workers, and fifteen states cover all firms employing one or more workers. Thirty state laws follow the federal minimum period of 20 weeks. The others cover shorter periods of employment and eight require contributions if people are employed at any time. The state laws tend to be more restrictive than the federal law and an employer who is not subject to the federal tax may still have to pay a state unemployment tax.

All states have some system of experience rating through which an individual employer's tax is changed from the standard rate in line with his past unemployment experience. This means that when unemployment is low the employer's contribution may be materially reduced. In 1954, the average employer contribution as a percent of taxable wages was 2 percent for all logging contractors, 1.5 percent for all sawmills and planing mills, and 0.8 percent for all pulp, paper and paperboard mills. The rates for individual employers may be higher or lower than the average depending on their own unemployment experience. An employer can deduct from his federal unemployment tax only the amount that he pays in state tax. But an employer whose state tax is low because of his good unemployment record is given additional credits against his federal tax so that it also is low. Most states have a requirement as to the solvency of the unemployment fund and can limit rate reductions or reestablish higher rates if the fund becomes depleted. In eleven states the rate may be raised above the customary 2.7 percent if necessary (the highest maximum allowable rate is 4.1 percent in Missouri).

Workmen's Compensation Laws

The insurance of workmen against losses from on-the-job accidents and industrial diseases differs from the other social programs in that it is purely a state undertaking. The federal government has compensation arrangements covering its own employees and does compile and publish statistics and information which influence the standards set in the compensation laws. But the laws themselves and the administration of them are entirely state undertakings. As a result the exact provisions of the laws are different in every state.

Workmen's compensation laws place on the employer the liability for paying compensation and for providing medical benefits and require him to bear the cost of this program. An employee injured by an industrial accident recovers a stipulated amount from the employer or his insurer, regardless of negligence. In return for this compensation he forfeits the right to sue his employer at common law for injuries within the act.

In 23 states, the workmen's compensation laws are compulsory — every employer subject to the law is required to comply with it. In

[1] *Editor's note.*—On January 1, 1957, subsequent to preparation of this article, the rate increased to 2¼ percent.

the other states, the compensation laws are elective; an employer may either accept or reject the act. However, an employer who rejects the act loses the customary common law defenses if he is sued by one of his employees as the result of an accident. He cannot claim that the employee assumed the risk of the job in accepting employment, that the accident was due to the negligence of fellow workers, or that the employee's own negligence contributed to the accident.

Employers covered by the compensation act are required to obtain insurance or to give proof of their financial ability to carry their own risk (which is known as "self-insurance"). Six states do not permit self-insurance by an employer. Eighteen states have established state insurance funds for workmen's compensation. In seven of these the state fund is exclusive; that is, the employer may not insure with a private insurance company. (But Ohio and West Virginia, which have exclusive state funds, do permit an employer to qualify as a self-insurer.) Eleven states have a competitive state fund and allow an employer to obtain insurance either with a private company or with the state fund.

The premium paid by an employer for workmen's compensation insurance is usually based on his payroll. The rate which he must pay for insurance depends on a number of factors: the actual occupation or type of job involved, past experience in the particular state with accidents in that occupation, the benefit level of the individual state law and the liberality of its administration, economic conditions within the industry or state, and the past accident experience of the particular employer. The individual state funds set up occupation classifications and establish premium rates to cover these factors. The basic premium rates for most private insurance companies are established by the National Council on Compensation Insurance, although other rating organizations exist.

There is a wide variation in the premium rates charged for forestry occupations. The "manual rate" (before any modification for experience) for logging varies from a low of $4.01 per $100 of payroll in one state to a high of $22.24 in another. In one state the manual rates are $2.50 for wood furniture manufacturing, $10.10 for sawmills, and $19.70 for logging. One monopolistic state fund has basic rates per man hour worked of 2.6 cents for wood furniture manufacturing, 5 cents for timber cruising, 6.8 cents for sawmills, and 29 cents for logging. The hazardous nature of logging is well demonstrated by a comparison of insurance rates. In the state of Washington only coal mines and coke oven operations pay higher rates than logging, and the rate for log trucking is almost eight times as large as that for general hauling and trucking.

Both the state funds and the private insurance companies adjust the rate which an employer actually pays in accordance with his own accident experience. The rate can be materially reduced for an employer who makes a real effort to prevent accidents and who establishes a good safety record. By contrast an employer who has poor safety control and a record of numerous accidents must pay more than the basic or manual rate for his insurance. These adjustments are large enough to be a real stimulus to increased safety in operation.

The Effect on the Forestry Employer

These four social programs impose real costs on forestry employers because labor is an important item in most forestry production. Compliance with the laws adds to the costs of a firm in both a direct and an indirect manner. Because of the Fair Labor Standards Act, the employer with the lowest wage rate in the country must pay at least $1.00 per hour for labor. If he wishes to extend his operations beyond 40 hours per week, he must pay at least $1.50 per hour for the labor he uses in that added operating period. His 2 percent OASI tax raises minimum wage costs to $1.02 and $1.53 respectively. The combined federal and state unemployment taxes can add another 3 percent, raising the minimum wage costs to $1.05 and $1.57. If he is engaged in logging, his workmen's compensation insurance might add another 4 to 22 percent, depending on the state in which he is operating. His minimum wage costs therefore might be somewhere between $1.09 and $1.27 per hour during the regular 40 hour week and between $1.63 and $1.90 per hour in any overtime period. (The annual wage of an employee who was receiving the minimum $1.00 per hour would not exceed the taxable wage limits of $4200 for OASI and $3000 for unemployment insurance even if he worked 48 hours per week and 52 weeks in the year. So the employer's entire payroll would be taxable.) Favorable unemployment and accident experience would reduce the firm's costs below the figures given, but in times of widespread unemployment a firm with a poor safety record might actually have minimum wage costs higher than those shown.

The combined effect of the four programs is to establish a minimum wage cost substantially higher than the Fair Labor Standards Act figures. The effect, of course, is more evident in the South than in other parts of the country where customary wage rates are higher than the legal minimum. An employer who is paying more than the minimum wage during the regular 40-hour week has higher additions to his base pay. A logging firm paying its workers $1.50 per hour might have a wage cost for a regular 40 hour week of $1.63 to $1.90 per hour depending on the state in which it operated. (Since this firm's workers would make more than $3000 per year by working fifty-two 40-hour weeks, any wages for work in excess of the 40-hour week would not be subject to the unemployment insurance tax in most states.) The marginal wage cost to this firm of an hour's overtime labor, therefore, would be between $2.38 and $2.79 depending

on its location. If a firm pays high enough wages that its employees can earn more than $4200 per year by working overtime, the marginal wage cost of any overtime hours beyond this total annual wage figure would not include the 2 percent OASI tax.

The indirect costs are largely due to bookkeeping. In order to comply with these laws a firm must keep complete records of the actual time worked and pay received by each employee. These records must be kept in such a form that they can be audited to prove that the employer is paying all the taxes for which he is liable. Periodic reports and payments must be made to the various agencies administering the programs. Different employees in the same firm are commonly paid at different wage rates. Individual employees may fail to put in the full time worked by the firm. Other individuals may occasionally put in overtime. Some workers quit and others are hired. If the employer tries to obtain all the exemptions to which he is legally entitled he may find that he has to hire an accountant or lawyer to make sure that he is not unintentionally violating the laws. Large companies with accounting and legal staffs are able to handle these problems rather painlessly, although they involve additional operating costs. To the small employer, they represent a real headache. Partly in recognition of the difficulties of the small employer, certain exemptions have been written into the laws. But this employer still has the problem of ascertaining the exemptions to which he is entitled and of making sure that his operations are so conducted that he stays within the letter of the law.

Exceptions which Apply to Forestry Employers

Exemptions from the Fair Labor Standards Act.—The Fair Labor Standards Act exempts from the minimum wage and maximum hours provisions (but not from the child labor provisions) forestry or logging operations with not more than 12 employees. The Act specifically names as forestry and logging operations: planting or tending trees; cruising; surveying; felling timber; preparing or transporting logs or other forestry products to the mill, processing plant, railroad, or other transportation terminal.

All of a firm's employees who are engaged in any of these operations are counted in determining whether the total number is 12 or less. Six may be planting trees and seven felling timber but none are exempt because the total is 13. The total number counts, regardless of how they may be divided into crews, locations, or shifts. However, workers engaged in other, non-exempt operations for the same employer are not counted. If a single firm employs ten men in logging and another ten in its sawmill, the men engaged in logging are exempt from the wage and hour law.

The Fair Labor Standards Act also exempts from the maximum hours (overtime) provision (but not from the minimum wage and child labor provisions) industries of a seasonal nature. A seasonal industry is one which engages in production during a season not substantially greater than six months and ceases production during the remainder of the year. In such seasonal industries an employee is exempt from the overtime provision if he is employed "for a period or periods of not more than 14 work weeks in the aggregate in any calendar year." The following forest industries have thus far been interpreted by the Administrator as being seasonal in nature:

a. The hauling on ice and snow roads of sawtimber and pulpwood in Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Pennsylvania, Vermont, and Wisconsin.

b. The felling, trimming and sap peeling of trees while the sap is running, including the operations of bucking and piling, if performed during the sap peeling season, wherever conducted.

c. Spring freshet driving of sawtimber and pulpwood throughout the United States.

d. Logging operations involving lodgepole pine, Engelmann spruce, and associated species of timber in Colorado, Wyoming and Utah.

Finally the Fair Labor Standards Act exempts from the minimum wage and maximum hours provisions any employee engaged in agriculture and from the child labor provision any worker employed in agriculture outside the school hours for the school district where the employee is living while employed. Forestry and lumbering are expressly included in agriculture if the operations are performed "by a farmer or on a farm as an incident to or in conjunction with such farming operations." In order to qualify as agriculture, such forestry and lumbering operations must be clearly subordinate to the farming operations.

Exemptions from Old Age and Survivors Insurance.—Work performed in connection with the production or harvesting of crude gum from a living tree, gum spirits of turpentine, and gum rosin is entirely excluded from coverage under this program.

Exemptions from Unemployment Insurance Laws.—The only employers exempt from the unemployment laws are those who employ fewer than the minimum number of employees specified in the federal law and the law in their own state or those who employ people for less than the minimum period of time specified in these laws.

Exemptions from Workmen's Compensation Laws.—Twenty-eight states exempt employers with less than some specified number of employees; in the other states all employers are covered. In only seven cases is the exemption granted to employers with as many as 4 employees but one state law covers only those employing 15 or more. Most states exclude agricultural employees from coverage.

The South Carolina law specifically does not apply to "employees or employers principally engaged in the business of operating a saw mill, planing mill, and/or manu-

facturing of shipping containers, nor to logging operations and work incident thereto, nor to employees or employers engaged in the production of turpentine." The Maine law specifically does not apply to employees engaged "in the operations of cutting, hauling, rafting, or driving logs, including work incidental thereto." However, a logging operation which is incidental to some business conducted by an assenting employer is covered unless the employer expressly excluded it in accepting coverage for the rest of his business. The Florida law exempts turpentine labor and the North Carolina law exempts sawmills and logging operators with less than 15 employees (although it applies to all other employers of 5 or more).

Implications for Forestry

The government social programs obviously have a direct effect on the growing, harvesting, and processing of forest products. But their total impact on forestry is probably greater than it appears at first glance.

These laws place a definite premium on being either a large firm or a very small firm in forestry. In 14 states the employer with less than 4 employees pays only the OASI tax; he is exempt from the other three laws. In many other states he is exempt from one or two of the laws. So the wage cost per man hour of the very small employer is lower than that of larger firms. In effect, he is subsidized by the government for being small. If he expands his operation by hiring more men he becomes subject to more taxes, and these fall not just on the wages of the added men but on his entire payroll. This means that expanding his output involves increasing marginal costs unless labor productivity is sufficiently higher in the larger operation to offset the higher wage cost. When the additional accounting problems are added, the picture becomes one to discourage expansion on the part of the very small firm.

At the other end of the size scale, the large firm enjoys certain competitive advantages as a result of these laws. The necessary accounting and legal costs can be spread over a large payroll. Effective safety programs may be installed for less than the offsetting saving in reduced compensation insurance rates. The large firm is in a better position to stabilize its employment and thus obtain lower rates for unemployment insurance. The fairly small firm—not large enough to achieve these savings but still large enough to be liable for all the taxes—is the one which suffers most from the cost effects of the social programs.

The Fair Labor Standards Act affects both the number of firms and the rate of output of existing firms in the forest industry. The marginal firm which was paying the minimum 75-cent wage became submarginal on March 1, 1956 unless it was able to cut its production costs in some other way. If the minimum wage should be raised further—as has been suggested—some firms which today are paying only one dollar per hour and still operating on the margin will undoubtedly go out of business. Since these are generally the inefficient firms, the long-run effect of this might be good for the industry but the dislocations in many local economies would be quite painful.

The overtime provisions of this Act reduce the short-run elasticity of supply of forest products. An increase in the price of lumber may bring about little increase in lumber production because the 50 percent premium for overtime work makes the marginal cost of increasing output by running a sawmill overtime very high. The overtime provision also makes some necessary forestry activities expensive. The wage cost of fire suppression at night or on weekends with regular company employees is much higher than the wage cost of the firm's ordinary production activities.

The increase in labor cost resulting from the social programs is a further stimulus to forestry firms to substitute capital for labor wherever possible in their production. Since productivity per man hour is still low in many forestry activities, this may be an altogether desirable effect.

From the employee's viewpoint, the laws as they now stand are not entirely equitable. The growth of the workmen's compensation programs indicates a general feeling that the insurance of workers against losses from industrial accidents through public action is a desirable social concept. Why then are workers in logging—one of the most hazardous occupations—specifically excluded from the protection of this program in some states? The idea that employers should be required to pay reasonable minimum wages and bonuses for work beyond reasonable periods of time has survived 20 years of application and been gradually extended. Why do these standards not apply equally to small logging and forestry operations, which have never been noted for high wages or short working hours? The social security program has been gradually extended, with popular approval, until today almost every employee and most self-employed people are covered. Why are gum naval stores workers separated out to be denied this old age insurance?

These questions raise doubts as to whether the exemptions which apply to forestry will be maintained indefinitely, despite the immediate hardship which their removal will work on the employers. (In 1955 the House voted to extend OASI coverage to turpentine and gum naval stores employees, but this provision was eliminated in the Senate committee and not restored in the final conference action.) If public pressure does not bring about changes, worker pressure likely will. Obtaining and keeping satisfactory labor is already a critical problem in many forest industries. If prosperous conditions continue, with no real shortage of employment opportunities, it will be surprising if workmen do not shun industries which refuse them the old-age and accident security they can obtain elsewhere.

These exemptions in effect sub-

sidize forestry at the expense of the employee. But why should forestry and the wood-using industries be subsidized by the government? Are these industries unable to compete in our economy without subsidy? If so, is it because they are inefficient and the continued maintenance of the marginal firms is really a misallocation of productive resources? Or is it because there are characteristics peculiar to forestry production which handicap these producers in the competitive economic struggle? Or does the trouble really lie in the bookkeeping and other difficulties of complying with the social program laws themselves?

If the exclusions exist solely because of the difficulties of these firms in complying with the laws, is there not some better way of handling this problem than that of excluding their employees from benefits enjoyed by most other workers? If these programs place unfair burdens on the small forestry employer, cannot these costs be offset in some way? Perhaps lower tax rates or partial exemptions from taxes (but not from coverage) can be worked out. Perhaps some simplification of records or even some other kind of subsidy is the answer. The governments administering these programs have an obligation here to somehow bring the forestry employees under these programs without penalizing the employers for the fact that they are small.

If the exclusions exist because forestry firms cannot compete in general with other business firms in the economy, two different questions are posed: (a) should forestry be subsidized by the governments and (b) if so, how should it be done? Though the first question merits discussion, we are not in a position to do it here. We may, however, deal with the second question on the grounds that the government is already subsidizing forestry. If such subsidies are justified for national defense or other public welfare reasons, should not the cost of these subsidies fall on all of the people? Would it not be best to use some form of direct subsidy such as those being used in agriculture and with the naval stores industry? Subsidizing forestry by excluding its employees from social benefits enjoyed by other workers does not look like the right answer.

Summary

The government social programs dealing with wages and hours, child labor, and old-age, unemployment, and industrial accident insurance affect most individuals and firms engaged in forestry and the wood processing industries. The financing of these programs places definite tax, accounting, and administrative burdens on forestry employers. These are most serious for the smaller firms. A number of exemptions have been written into these laws, which apparently, are at least partly aimed at helping the smaller firms. These laws, through their tax impact, affect the number, size, and rate of output of forestry firms. Some of the effects appear to be desirable. But the long-run effect of exclusion from these social programs of certain forest and wood-industry employees is not one of these. Some government action to eliminate the inequities in coverage under these programs and to replace these disguised subsidies with something more realistic appears to be overdue.

Because the social programs discussed in this article are administered by so many different agencies, information on them is not readily available in any one place. The most useful sources of information are those in the list which follows. They contain much more detail on the coverage and specific provisions of the laws than I have been able to include here.

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Control of Sunscald and Subsequent Buprestid Damage in Spanish Cedar Plantations in Yucatan[1]

J. M. Miller,[2] J. P. Perry, Jr.,[3]
N. E. Borlaug[4]

In 1950 the Mexican lumber firm Maderas Trópicas was attempting to establish large-scale plantations of Spanish cedar (*Cedrela mexicana* Roem.) by replanting its cut-over forest lands in Yucatán. A nursery for production of planting stock was established (Fig. 1) and an efficient transplanting operation put into effect. Transplant stock was moved directly from the nursery to the forest via tramcarts operating on an old logging tramroad (Fig. 2). Strips or *brechas*, spaced at 10-meter intervals perpendicular to the tramroad, were cleared by machete into the forest and savanna along each side of the road. Along each strip, at 8-meter intervals, small plots approximately 2 meters in diameter were cleared of all vegetation and a young tree was planted in the center of each plot (Fig 3).

Subsequent routine inspection and clearing operations revealed that the rate of survival in these plantations was extremely low and suggested that most of the losses were caused by damage to the young trees at or near the ground line (Fig. 4). The company asked the FAO Forestry Mission in Mexico for assistance, and in March 1952 John M. Miller, entomologist for the mission, accompanied by Dr. N. E. Borlaug, visited the plantations to investigate the causes of the damage.

They found that 90 to 95 percent of the young trees had suffered some type of injury near the ground line, and that many of the injured areas had been infested (Fig. 5) by a species of Buprestid beetle. Since this borer normally invades only wounded, dead, or dying woody tissues, the primary cause of the damage remained undetermined until a plantation recently established in grass-type savanna was visited. Here a careful examination revealed that 95 percent of the plants had suffered severe sunscald damage on the stem from 1 to 5 centimeters above the ground line.

It was noted that the bark surface damaged by sunscald soon acquired a characteristic pale orange-yellow color distinct from the normal light grey-green bark coloring of the young trees (Fig. 6). Once this fact was established it became a simple matter to locate sunscald-damaged plants within the plantations.

It was found that a high proportion of the young trees were killed outright by girdling due to sunscald. Continued observation of recently damaged plants revealed that the injured areas, usually only a centimeter in diameter, were frequently invaded by a borer and the seedlings girdled and killed through subsequent

[1]Paper No. 52, Agri. Journal Series of The Rockefeller Foundation.

[2]Entomologist for the United Nations Forestry Mission in Mexico. Mr. Miller died in Mexico City shortly after returning from a trip to the Yucatán Peninsula collecting data and information included in this report.

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[4]Pathologist, Rockefeller Foundation Agricultural Program in Mexico.

Fig. 1.—Nursery for production of *Cedrela mexicana* planting stock, Yucatán.

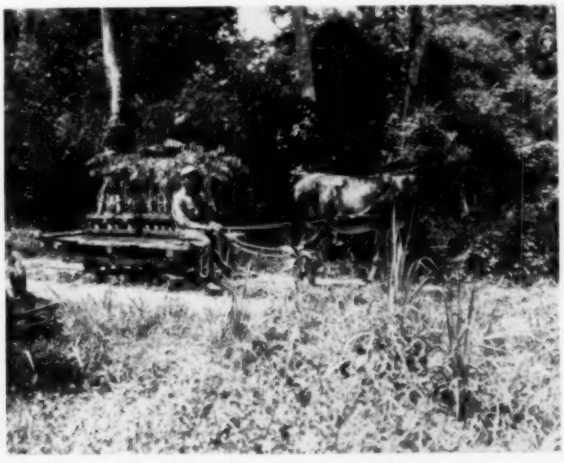

Fig. 2.—Moving planting stock from nursery to plantation.

FIG. 3.—Cleared area along the *brecha* in which the young tree is planted.

FIG. 4.—*Cedrela mexicana* in plantation damaged by sunscald and subsequent Buprestid infestation.

FIG. 5.—Typical sunscald and Buprestid damage.

mining activity of the larvae. In other cases insect damage together with the rapid development of wood-rot fungi served to enlarge the damaged area (Fig. 7). With the resultant loss of vigor and growth the young trees were unable to compete with the growth of the surrounding vegetation and were soon overtopped and lost. It is interesting to note that the greatest incidence of insect infestation occurred in row number 3 (Table 1), which was parallel and adjacent to the forest. Rows number 1 and 2 were located entirely within the grass-type savanna. It was also observed that mortality was highest during the first year after the seedlings were transplanted into the field.

TABLE 1.—SUNSCALD AND RELATED BUPRESTID DAMAGE IN *Cedrela mexicana*, GRASS-TYPE SAVANNA PLANTATION, MARCH 1952

Row number	1	2	3
Total number of seedlings in row	66	89	30
Number of seedlings damaged by sunscald	63	81	28
Percent of seedlings damaged by sunscald	95	91	93
Number of seedlings damaged by sunscald then infested with Buprestid	2	5	6
Percent of seedlings damaged by sunscald then infested with Buprestid	3	5.5	20

In order to obtain adult beetles for identification it was decided to transplant a number of infested young trees to one of the Rockefeller Foundation greenhouses near Mexico City. A number of mature Buprestid specimens were obtained in this manner, but efforts to identify them were unsuccessful and a few individuals were sent to Dr. E. C. Van Dyke at the California Academy of Sciences. Subsequent correspondence with Dr. Van Dyke revealed that the specimens belonged to a new species, described by him as *Chrysobothris yucatanensis*.[5]

[5]Van Dyke (posthumous). New Coleoptera from western North America (*Carabidae, Melasidae, Buprestidae, Curculionidae*). Pan-Pacific Entomologist 29(2): 107-108. 1953.

FIG. 6.—Left to right: canker formed on stems as a result of sunscald damage; young stem completely girdled as a result of sunscald; stem showing the damaged area beginning to shrink and discolor; stem showing first effects of sunscald damage; stem of healthy young *Cedrela mexicana* tree.

FIG. 7.—Young *Cedrela mexicana* tree severely damaged by sunscald and subsequent Buprestid infestation.

FIG. 8.—Shading cylinder of lathe refuse placed around young tree already transplanted.

In order to eliminate the primary damage by sunscald it was recommended that the company employ some method of protecting the young stems from the high temperatures of the cleared planting areas. Two methods were suggested: a shading device around the stem of the plant when transplanted into the cleared area or leaving enough native vegetation in the planting area to ensure the transplants partial shade rather than full sunlight. If successful, the latter method promised in addition to reduce the cost of clearing operations.

A number of rows of young trees were planted by the company for a test of both the recommended methods. An inexpensive way of shading the stems was devised using refuse strips from the company's leg lathe. Following the planting operation, short strips approximately 8 to 10 inches wide were wrapped loosely around the stem and then thrust into the ground (Fig. 8). These afforded excellent shade to the part of the stem nearest the ground line and by the end of the rainy season were completely destroyed by rot so that hand removal was unnecessary. To try out the second method, clearing crews were instructed to leave sufficient woody vegetation to shade the planting area partially at all times.

In June 1954 the plantings were revisited for a check on the results obtained. Use of the loose cylinders around the young plants had reduced injury by sunscald to approximately 35 percent, but many young plants with the lower part of the stem perfectly shaded had been damaged by sunscald. In an effort to determine the reasons for this it was decided to check the condition of the plants before transplanting. Accordingly an inspection was made of a number of tramcart loads of young plants ready to be moved into the cleared strips for planting. It was found that 27 percent of the young plants had already suffered sunscald injury before they were transplanted in the *brechas*.

Reviewing the entire transplanting operation, it was noted that nursery stock was maintained under partial shade (Fig. 1) until ready to be moved to the plantations. Workers then moved the young trees from the shaded nursery and placed them in groups, in full direct sunlight, awaiting the return of one of the tramcarts. This

FIG. 9.—Placing strips of lathe refuse around the stem of the young plants immediately upon removal from the nursery plots.

waiting period varied from a few minutes at times to an hour or more.

Stems of young trees still in the nursery were also inspected for sunscald injury; 5 percent of the plants were found damaged. All of the damaged plants in the nursery were located at the borders of the shaded nursery plots, where they were subject to direct sunlight during part of the day.

In summary, 5 percent of the nursery stock had suffered injury from sunscald prior to movement from the shaded nursery plots and an additional 22 percent of the plants were damaged by sunscald by the time they arrived at the planting site. Since in the experiments referred to above the condition of the seedlings before they were transplanted and shaded with strips was unknown, it was impossible to state just how effective this method was in reducing damage by sunscald. However a comparison of the results obtained where artificial stem shading was used with the results where no shading was used (Table 1) definitely shows that injury from sunscald can be reduced by artificially shading the lower part of the stems of the young plants. Shading the plants by leaving overhanging vegetation was abandoned as impractical since vines and other vegetation soon completely overran the planting area and the young plants were lost.

In view of the high percentage of sunscald damage occurring in the nursery and before the transplanting operation had been completed, it was recommended that: (1) nursery shade be extended in order to protect trees on the edges of the beds; (2) a "hardening" period of gradually reduced shade be given to beds of seedlings soon to be transplanted; (3) all stock moved from the nursery be protected by placing strips of lathe refuse around the stems immediately upon removal from the nursery (Fig. 9). It is believed that these precautions will almost entirely eliminate sunscald injury and subsequent damage by *Chrysobothris yucatanensis* in plantations of *Cedrela mexicana* in Yucatán.

←PRESENTATION of the 1957 Smokey Bear Forest Fire Prevention Program. Shown are: *Standing*, James P. Felton and Richard Stow, Foote, Cone & Belding; J. Morgan Smith, U. S. Forest Service; Ervin Grant, Foote, Cone & Belding; Anna Mary Freas, Forest Service; Henry C. Wehde, Jr., The Advertising Council, Inc.; Richard E. McArdle, chief, Forest Service; William W. Huber, A. Brands, and Wallace E. Wheeler, Forest Service. *Seated*, Gareth C. Moon, state forester, Montana; Clint Davis, Forest Service; Roger L. Guernsey, state forester, Idaho; James N. Diehl, Forest Service; Alden T. Cottrell, state forester, New Jersey; James C. Turner, Jr., district forester, Macon, Ga.; and Merle S. Lowden, Forest Service.

Accidents Cost Money

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FORESTERS AS A group, regardless of their native habitat or degree of servitude, are constantly kept informed by their employers of the economic facts of life as far as their responsibilities are concerned. Those who have reached positions of responsibility in their field have been faced with the necessity of paring costs from time to time, because prices are down, or because costs are higher than anticipated, or because the board of directors doubts the wisdom of the purchase of some high-cost items in the budget. To some of these has come first-hand knowledge of the tremendously high cost of accidents in the industry, to say nothing of the frequent tragedy connected with such accidents. Even so, relatively few foresters have given much more than passing thought to the seriousness of the accident frequency problem in American forestry, and only a handful have taken it upon themselves to try to do something about it.

It is a matter of public record[1] that forest industries as a whole are charged with the worst record of accident frequency of any major industry in this country. The term "forest industry" is of course an all-inclusive one, covering all types of wood-using operations from the actual logging of the tree in the woods to its utilization in any of a multitude of manufacturing plants which may produce anything from laminated beams to paper bags. Some of these operations are conducted on a very large scale and are extremely well organized; others are quite small and are poorly managed.

According to the latest records of the National Safety Council, the number of accidents resulting in time lost from work, expressed in terms of frequency per million man-hours worked, is higher in the lumber industry as a whole than in any other industry; worse even than the coal mining industry.[2]

TABLE 1.—ACCIDENT FREQUENCY IN REPRESENTATIVE INDUSTRIES, BASED ON 1954 EXPERIENCE

Type of industry	Number of lost time accidents per million man-hours worked
Communications	1.3
Chemical	4.1
Pulp & paper mfr.	7.2
Petroleum	8.0
Air transport	14.3
Coal mining	25.8
Lumber	30.9
Average all industries	7.2

Table 1 includes only the records of member companies in the National Safety Council. As a rule, membership in that organization is confined to the larger, more progressive companies whose safety records would be expected to be far above the average for all plants in the industry. Similar data compiled by the Bureau of Labor Statistics, U. S. Department of Labor, show the startling effect of inclusion of smaller plants with the larger ones (Table 2).

TABLE 2.—ACCIDENT FREQUENCY IN REPRESENTATIVE INDUSTRIES BASED ON 1954 EXPERIENCE

Type of industry	Number of lost time accidents per million man-hours worked
Synthetic rubber	1.6
Explosive chemicals	2.8
Cotton yarn & textiles	8.0
Pulp, paper & paperboard	11.6
Miscellaneous paper	12.7
Millwork	21.4
Plywood	27.6
Wooden containers	29.5
Sawmills	42.0
Logging	74.3
Average, all industries	11.9

From a standpoint of accident severity, the record is similarly appalling. Here, although the worst position is relinquished to the coal mining industry, according to the National Safety Council, the lumber industry ranks next to the bottom (Table 3).

TABLE 3.—SEVERITY OF ACCIDENTS

Industry	Average number of days lost per 1,000 man-hours worked
Communications	.13
Chemical	.57
Petroleum	.80
Pulp & paper manufacture	.86
Air transport	.53
Lumber	3.68
Coal mining	4.79
Average, all industries	.80

The very diversity in size and type of operation contributes in large measure to the wide divergence in accident frequency and seriousness, but there are several other factors aside from mere size which join in contributing to the high cost of accidents in forest industries. Foremost among these must be listed the relative hazard of some of the work accomplished. The felling and bucking of timber, for example, is an extremely hazardous occupation. Trees ranging from thirty feet to several times that in height, and from a few inches to several feet in diameter must be brought to the ground. These trees are in every possible condition of vigor; from perfect soundness to virtual shells of wood; from whisps of crown to wide spreading cover; from single unblemished stems to branch-studded "apple-tree" types, and from tall straight specimens to gnarled "stooping" monstrosities.

The tools which are used in felling and bucking timber contribute strongly to the high accident toll. Chain and circular power saws which are not equipped with safe-

[1]U. S. Dept. Labor, News, Dec. 30, 1955, 12 pp.

[2]National Safety Council. Accident facts. 1955. P. 26.

ty guards are standard equipment on logging jobs, as are double-bitted axes and cant hooks. To these must be added the heavy machinery used in handling and transportation; bulldozers and tractors, truck and semi-trailers; all instruments of destruction even when reasonable care is exercised. Finally, the effect of all this lethal equipment is compounded when it is placed in the hands of the careless or incompetent person—the type of individual too often found in the woods.

Aside from the relative hazard of the work and the danger inherent in the tools employed, there are other factors which work together in some regions to aggravate the seriousness of the situation: (1) Distance from medical aid. (2) Distance between workers, hence difficulty of supervision, and lapse of time before accidents are discovered. This is particularly true in the southern and eastern states. (3) Intelligence and skill of workmen.

Many woods operations are normally conducted miles away from even the most rudimentary first aid facilities. Crews for a single woods operation may be scattered over forty or more acres of timberland. And it is an unfortunate axiom, at least on some southern woods operations, that highly intelligent and skilled workmen tend to be the exception rather than the rule.

It is a source of constant surprise to the observer that enterprising safety engineers and consulting foresters have not already offered their services on a part-time basis to small companies and contractors who cannot afford to hire such men on a full-time basis. So much could be done with comparatively little cost or effort which would effect huge reductions in cost. As an example of this may be cited the experience of one Louisiana operator who reduced the cost of his Workmen's Compensation Insurance premiums by $57,000 in a single year. This represented a savings of 45.9 percent over those of the previous year according to the data furnished by Southeastern Compensation Rating Bureau, New Orleans. He accomplished this primarily by employing a secretary who kept records of, and screened, all job applicants before permitting their employment. This type of screening, together with medical pre-examination, prevented this particular contractor from facing situations where, for example, a workman files a claim against a subcontractor for a job-connected hernia, and later changes employers and files another claim against the new employer for the same hernia.

Regardless of the factor involved, it is increasingly evident that many employers find it difficult to pay the present high cost of workmen's compensation insurance without receiving higher rates for their products which are already being produced at inflated prices. This fact is readily disclosed by an examination of the base rates involved in various segments of the industry. A representative sample of these rates by sections of the country is shown in Table 4.

The cost of workmen's compensation insurance is a matter of increasing concern to industrialists who nevertheless recognize its necessity. The subject is as distasteful to insurance companies as it is to the purchasers of such insurance. Under the laws of the various states, a worker is entitled to insurance coverage against injuries which are job-connected. The amount of coverage and maximum benefits vary between states, but all states now have some type of workmen's compensation insurance. An examination of the pie-chart (Fig. 1) indicates one of the reasons why insurance companies do not like to write this type of insurance. This particular chart was prepared for Louisiana; however, statistics which are roughly similar apply to the other states. It should be noted that of the net premium rate, only 2.5 percent is available for profit, and it is available only when contingencies permit it. It should be further noted that insurance companies are forced by statute to write this insurance if they afford complete insurance services otherwise.

It is at once obvious that the cost of Workmen's Compensation Insurance may increase the cost of cutting pulpwood in Louisiana almost exactly 15 percent, while the labor cost for log cutters in Virginia carries an insurance cost of approximately 4¼ percent. These are, of course, basic or average rates which may be discounted from, or even increased, depending upon experience and other factors. No stretch of the imagination is required to decide what part of the net profit of the operation is being funnelled off by the cost of insurance, hence indirectly by the cost of accidents.

TABLE 4.—REPRESENTATIVE BASE RATES[1] FOR WORKMEN'S COMPENSATION INSURANCE[2]

State	Logging & Lumbering Code 2702	Sawmills Code 2710	Veneer Mills Code 2915
	Dollars	*Dollars*	*Dollars*
California	7.66	6.13	2.67
Colorado	9.74	5.60	1.69
Louisiana	12.79	8.25	4.20
Michigan	13.37	5.05	1.85
Mississippi	11.86	5.75	2.79
New York	19.70	10.10	3.80
Virginia	4.23	2.87	1.14

[1]Rates are based upon the cost to the employer per $100 of payroll. The State of Louisiana carries, under Code 79, a separate schedule for pulpwood logging which currently carries a base rate of $14.99. It should be brought out that this schedule also includes so-called "stumping" or removal of pine stumps from cutover land for wood naval stores. This operation frequently involves the extensive use of explosives.

[2]Data furnished by Southeastern Compensation Rating Bureau, 510 Communications Building, New Orleans, Louisiana.

The relative hazard involved in the various segments of industrial woods work can be most easily determined by a comparison of the above rates with those for other representative occupations as listed for Louisiana in Table 5.

TABLE 5.—COMPARISON OF BASE RATES FOR WORKMEN'S COMPENSATION INSURANCE[1]

Category	Basic rate per $100.00 of payroll
Clerical office worker	$ 0.11
Jewelry store clerk	0.23
Lowest chemical plant rate	1.28
Furniture manufacturing	1.78
Iron and steel manufacture	2.25
Chemical pulp mill worker	2.31
Commercial airline pilot	3.22
Planer mill worker	3.92
Highest chemical plant rate	6.65
Oil drilling	7.23
Wood preserving plant	7.42
Logging & lumbering	12.79
Tunnelling	13.07
Pulpwood logging	14.99
Aircraft operation: crop dusting or stunt flying	16.22
Cleaning outside of buildings	22.22

[1]From Southeastern Compensation Rating Bureau.

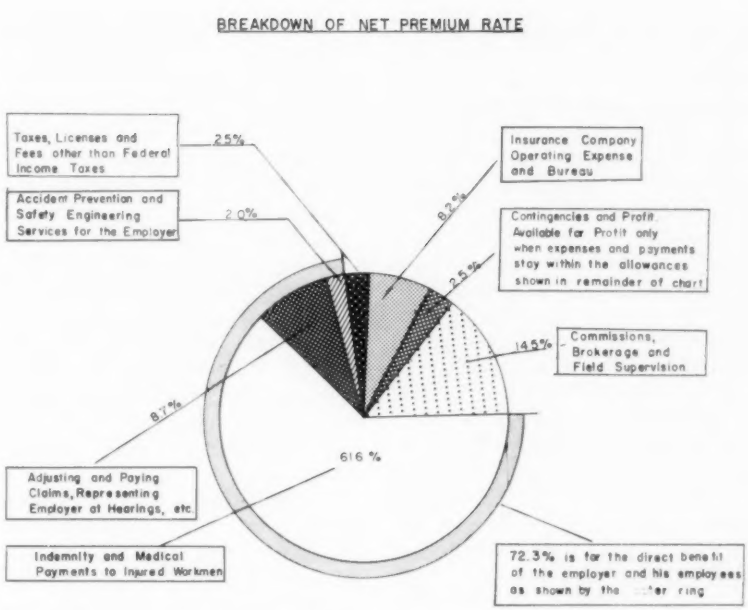
BREAKDOWN OF NET PREMIUM RATE
Taxes, Licenses and Fees other than Federal Income Taxes
2.5%
Accident Prevention and Safety Engineering Services for the Employer
2.0%
Insurance Company Operating Expense and Bureau
8.2%
Contingencies and Profit. Available for Profit only when expenses and payments stay within the allowances shown in remainder of chart
2.5%
Commissions, Brokerage and Field Supervision
14.5%
8.7%
61.6 %
Adjusting and Paying Claims, Representing Employer at Hearings, etc.
Indemnity and Medical Payments to Injured Workmen
72.3% is for the direct benefit of the employer and his employees as shown by the inner ring

FIG. 1.—Percentage Distribution of Workmen's Compensation Insurance Premium. (Prepared by Southeastern Compensation Rating Bureau, New Orleans, La.)

It should be pointed out that base rates for Workmen's Compensation Insurance are developed from tables of experience which are compiled by the National Council on Compensation Insurance. This organization, established in 1922, is jointly owned by the insurance companies which write compensation insurance. Its function is entirely statistical in nature, in that all claims from all sources are collected, analyzed, and collated. From this experience, new rates are developed which must coincide with the cost of payment of past claims plus the profit allowance and administrative costs permitted by law.

A new employer, entering the field of employment, and applying for coverage of his employees for Workmen's Compensation Insurance, must qualify by paying the base rate premium for the category in which his work is included, for his first year of operation. At the end of the year, his rate may be either increased or decreased, depending upon the actual experience of claims filed and paid on his operation during the year. Accordingly, it is in the interest of the employer, from a standpoint of economics alone, to effect safe practices wherever possible as a means of reducing direct expense.

An employer who has established himself by experience may profit by rate reductions based, as indicated above, upon the actual number and size of claims arising from his operations in past years. Several alternative plans are available for him to choose from, based upon the size of his operation among other factors; however, all of them endeavor to average out inequalities of time and place in arriving at representative rates.

A great many of the woods or plant organizations which comprise the generic term "forest industry" are limited in size and often are poorly financed. Although size alone is no criterion, it is frequently true that the owner-manager of a small operation is so preoccupied with daily details that he is seldom able or willing to give attention to the broader aspects of supervision, including the reduction of possible unsafe practices. As a matter of fact, he may not even be aware of the very acts or situations which contribute largely to accident frequency and consequent high Workmen's Compensation Insurance rates on his job. Production is usually his strong point, and he may be inclined to be somewhat impatient with other disturbing factors of cost. In many cases, he may not even recognize the basic causes of a malfunctioning operation.

Certain recommendations may be advanced which might afford some relief to interested employers. It is of course recognized that some, or perhaps all, of these suggestions may appear to be so simple as to be unproductive of measurable results. As rejoinder it may be pointed out that the files of insurance companies are filled with cases where economies have been effected in fields other than forestry by the direct application of these same measures. Hence, it would seem to be worth trying to a greater extent in the field of forest industries. The recommendations are these:

1. Ask the insuring company to cooperate by loan of safety engineering services. Most, if not all, carrying companies have safety departments which are available to their clients upon request. This is a continuing program which can

be used again and again as a matter of inspection aids. Since the employer is paying, indirectly, for this service, he might as well use it.

2. In the case of pulpwood logging, or similarly constituted operations, it is suggested that several contractors or dealers combine to organize their own safety engineering. Again, insurance companies will gladly lend their support in setting up such departments. Such an arrangement would measurably reduce the cost of the service to the individual contractor.

3. Under No. 2 above, it is suggested that an organization office be set up, that a secretary be hired, and the individual files be kept on each person employed by the several employers within the organization. These files would contain information concerning the employee's health, his physical defects, and his record relative to past insurance claims, to mention a few items worthy of record. One of the features of such an office might be to insure that each person hired would undergo a physical examination. This would prevent the practice of having an employee file a claim for compensation insurance on old injuries.

4. Monthly safety meetings for a few key persons in each organization would point up the matter of teaching safety in supervision.

5. Closer supervision on the part of foremen and the safety man. Spot checks on the performance of individual employees should be a continuing feature of the program.

6. Perhaps the most important single point to be emphasized is that the employer should set up simple safety rules to be followed by all employees, and that continued violation of the rules should result in dismissal. The employee who realizes that his job depends upon his safety habits will be inclined to observe safety regulations.

Forest managers have never been slow to develop ideas or to borrow from other fields in their search for less expensive or more efficient methods in all technical phases of their work. In the matter of safety, however, the profession has been delinquent. Some progress may have been made on a regional basis, but the statistics remain unchallenged on a national basis. Even the hard hats which are commonly accepted in the West are as commonly viewed as objects of curiosity in parts of the South and elsewhere. Foresters have achieved positions of responsibility in all types of forest industries. It would seem time for them as well as for all foresters in supervisory positions to reappraise the safety habits of their associates, their employees, and themselves.

Problems of Managing Upper Michigan's Coniferous Swamps

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CONIFEROUS SWAMPS are one of the most commercially important segments of the forest resource in the Upper Peninsula of Michigan. They occupy slightly more than 1 million acres, or roughly 10 percent of the total forest area in the Peninsula.

Spruce and balsam pulpwood is the most valuable and sought-after product of these swamps at this time. Cedar and tamarack products, including posts, poles, and tie cuts are next in importance. Some sawlogs are cut from these four species, but the occasional hemlock, hardwood, and white pine trees provide most of the sawlog material obtained from coniferous swamps. Christmas trees, material for wreaths and decorations, and medicinal raw materials are some of the less important products. In 1954 the forests of the Upper Peninsula yielded an estimated 252.5 thousand cords of spruce and balsam pulpwood[3]—about 98 percent of the pulpwood production from these species in the entire state.

Without a doubt, the most commonly recognized recreational value of coniferous swamps is the habitat they furnish for many species of game birds and animals. The whitetail deer population of the Upper Peninsula is directly dependent on the coniferous swamps for winter food and cover. The annual November lineup of hunters at the Straits of Mackinac ferry provides a colorful tribute to the importance of this value. The Upper Peninsula population of white-tails in 1955 was estimated by the Michigan Conservation Department to be 300,000 to 350,000, of which about

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[2]Maintained at St. Paul 1, Minnesota, in cooperation with the University of Minnesota.

[3]Unpublished data of the Division of Forest Economics, Lake States Forest Experiment Station.

26,500 were harvested that fall. In addition the wooded swamps of Upper Michigan provide high-value, year-round food and cover for the following animals: Beaver, racoon, weasel, ruffed grouse, fox, grey squirrels, snowshoe hare, and bear; while other animals find lower value or seasonal food or cover (*11*).

Stand Conditions

Usually, four cover types—northern white-cedar (SAF Type 37), black spruce (SAF Type 12), tamarack (SAF Type 38), and spruce-fir (SAF Types 4 and 7)—are considered to occur on swamp sites. These types are commonly intermingled, the many variations making type classification difficult. The cover types may be briefly described as follows:

Stands where northern white-cedar (*Thuja occidentalis*) is the major species are the most extensive in the coniferous swamps of the Upper Peninsula (Fig. 1). They are found on poorly drained peat and mucks that are not strongly acid and that usually have some movement of water. Mixtures of species are extremely varied although northern white-cedar always predominates. Associated species are balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), eastern white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), white spruce (*Picea glauca*), tamarack (*Larix laricina*), red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), quaking aspen (*Populus tremuloides*), bigtooth aspen (*P. grandidentata*), black ash (*Fraxinus nigra*), balsam poplar (*Populus balsamifera*), and paper birch (*Betula papyrifera*). Composition is primarily dependent upon soil type and moisture conditions.

Stands with black spruce as the predominant species are also found on poorly drained peat and muck soils, but these soils are usually more acid than those where the cedar type occurs, and the surface water tends to be stagnant. The species commonly associated with black spruce include most or all of those listed under the cedar type, but spruce, rather than cedar, is the major component of the stand. On the poorest sites of this type trees never reach merchantable size.

Tamarack stands are generally confined to bog areas where tamarack initiates forest succession, often following the sedge mat or sphagnum stages (*14*). The sites are mostly cold, very wet areas of deep peat. Under better site conditions either black spruce or northern white-cedar, or both species, occur with the tamarack and eventually take over the stand. This type, once considerably more important than it is now, was almost completely destroyed by the larch sawfly (*Pristiphora erichsonii*) between 1897 and 1910 and is now a relatively minor part of the coniferous swamps.

The spruce-fir type usually occurs on moist uplands, but occasionally is found along the borders of swamp areas. Hardwoods are much more prevalent on these swamp borders than in the other swamp types and tend to take over the site after logging or fire. Species frequently found are white spruce, black spruce, balsam fir, red maple, aspen, cedar, yellow birch, black ash, elm (*Ulmus americana*), and hemlock.

The species occurring in coniferous swamps exhibit a wide variety of characteristics that must be recognized by foresters when developing techniques of swamp management. For example, some species are short-lived while others, like cedar and black ash, live for many years. Some seed in spring while others are fall seeders. Seedbed requirements vary. So also do species tolerance (i.e., balsam fir versus tamarack) and juvenile growth rates.

As mentioned above, these types are frequently interwoven and gradations between them are common, as soil and moisture conditions differ greatly over relatively small swampy areas. Consequently, the management of these swamps may be most effectively undertaken if they are considered as one broad, all-inclusive "mixed coniferous swamp" type. The techniques discussed below are applicable generally to all four types.

Present Cutting Practices

The most effective cutting method has not yet been recognized or developed, partly because of the complex nature of the swamps. The most common cutting methods now used are clear cutting, diameter or stick limit cutting, and selection cutting. Clear cutting occurs most

FIG. 1.—Cedar swamp forest.

frequently, and probably diameter or stick limit is the next most common. In designated cuttings where the limit is low (either two sticks or a small stump diameter), the residual stand generally resembles commercial clear cutting or "chopper's choice" operations. The selection cuttings, of course, leave much heavier residual stands.

Potentialities

Study of mature coniferous swamp stands reveals the productive capacity of many swamp sites. For example, basal areas in excess of 250 square feet per acre in uncut cedar stands with a net volume of over 40 cords per acre are not uncommon. Fully stocked, 120-year-old stands on medium sites in the black spruce type of northeast Minnesota have yielded 30 cords per acre from trees 5.5 inches d.b.h. and larger (*5*).

Although growth of individual trees may be relatively slow, the dense stocking possible on these sites can still result in considerable volume growth per acre. Cedar swamps are capable of producing from ¼ to ⅔ cords per acre per year the first 100 years (*13*). In the black spruce type in Minnesota, after moderate cutting, dominant and codominant black spruce trees will grow at a rate of approximately 1 inch in diameter in 10 years (*9*).

The present heavily cutover or unmanaged condition of most of the coniferous swamp areas in the Upper Peninsula leaves much to be done before their productivity approaches its upper limit.

Problems of Management

The problems of managing these swamp stands are numerous, and most of them appear difficult to solve. Some of the courses of action needed to develop methods of meeting these problems are indicated by studies and experience in handling similar forest types in other areas. That most of the problems are closely interrelated and should therefore be attacked simultaneously by studies of broad scope is shown in the following discussion.

Reproduction

The most important problem immediately faced by managers of these swamps is how to cut them to insure a new stand that will produce the highest possible amount of valuable coniferous products. A logical first step in this direction is to achieve adequate natural regeneration of the most desirable coniferous species the site will maintain. In 1950 and 1951 a comprehensive survey of reproduction following commercial swamp cutting practices was made to determine the character of stands that were developing (*17*). The types of cutting sampled were clear cutting, diameter limit, and selection. Nine cuttings on mineral soil, 14 on peat, and 33 on muck were sampled. Briefly, the following information was obtained.

1. New forest stands are becoming established under present logging practices.
2. These new stands contain a larger proportion of hardwoods on all soil types.
3. The proportion of northern white-cedar on the muck and wet mineral soils where it grows best has dropped.
4. Black spruce reproduction is low on the peat soils where it previously was the main species.
5. Because of its aggressive reproduction, balsam fir is increasing its importance on all soil types.
6. Only on the wet mineral soils is aspen invading the swamps.
7. Generally, the coniferous reproduction is more satisfactory on the partially cut than on the clear-cut areas.

More specific observations were made in the survey for each of the soil types, and a few of them may serve to illustrate the complexity of coniferous swamp regeneration. For example, although cutting on peat soils resulted in new stands with more hardwood and less spruce than the original, the ability of balsam fir and white-cedar to come in satisfactorily indicates that coniferous stands can be maintained on these sites. On muck soils, despite adequate coniferous stocking in the reproduction, the increase in hardwoods is a serious problem because they usually outgrow and overtop the conifers for a long time. Most of these hardwoods are of low value and cannot be fully utilized. On wet, poorly drained mineral soils less hardwood reproduction results from partial cutting than from clear cutting, while on muck and peat soils the reverse is true.

The increase in hardwood reproduction and the lack of white-cedar and spruce on some soils are believed to reduce stand productivity. Hence, a smaller yield of conifers is expected from the new stands unless early improvement or partial cuttings are made.

The survey reviewed above clearly indicates the magnitude of the problem of regenerating these swamps without the undesirable changes in composition that follow present cutting practices. The problem may best be clarified by examining some of the factors that are causing these changes in composition.

Seed supply.—Conifers usually produce an abundance of seed each year, even in partially cut swamp stands (*5, 7, 10*). This is equally true of the hardwoods in much of the cedar and spruce-fir types. Cedar and spruce, of course, reproduce by layering as well as from seed. Generally, the seed supply is no problem although squirrels have been known to clip off much of the spruce cone crop.

Germination and seedbed.—Of the conifers, balsam fir generally shows the most ability to germinate and become established on these swamps. Next is cedar, with spruce a very poor third. The hardwood species, red maple and black ash in particular, are prolific seeders and readily become established on all sites. The problem is how to modify the seedbed conditions to encourage spruce reproduction. Exposing peat either mechanically or by burning makes a favorable seedbed for black spruce if the surface is not subject to flooding (*6*), and the species usually becomes successfully established somewhat more readily in clearings than under tree cover.

The scarcity of spruce seedling reproduction in swamps has been attributed to low temperature of the seedbed during the growing season, the saturated condition of the soil, and lack of mineral soil and sunlight.

Seedling mortality.—Study of reproduction in uncut swamp stands indicates that the bulk of the thousands of seedlings per acre that do germinate will die before reaching sapling size. For example, in two uncut cedar-spruce-balsam stands, a sample of over 300 milacre plots showed that 68 percent of the plots supported seven or more balsam seedlings, 49 percent had seven or more cedars, and 52 percent had seven or more hardwoods.[4] Yet, trees of sapling size were scarce. The causes of the heavy seedling mortality included damping-off, excessive shade, close competition, overtopping by brush and larger sizes of tree reproduction, flooding, drought, animals, insects and others.

Logging slash.—Even light partial cuts in coniferous swamps result in a considerable amount of slash per acre. A classification of slash by depth and density on individual milacre plots was made following five methods of cutting in two mixed conifer swamps. The extreme case was the clear-cut areas where 55 percent of the plots were completely covered by slash and 66 percent were found to have from one-fourth to complete coverage of slash over 3 feet deep. Only 9 percent of the plots were completely free of slash. As a contrast, in the light-selection-cut area only 11 percent of the plots were completely covered, 21 percent had slash over 3 feet deep, and 46 percent of the plots had no slash (*3*).

Slash removal by piling or by piling and burning was of considerable value in restocking a partially cutover black spruce stand in Minnesota (*12*). In the survey of cutover swamps in the Upper Peninsula, areas of light to moderate slash were consistently better stocked with reproduction than those areas free of slash or covered with heavy slash.

Brush competition.—Competition from brush species hinders reproduction in all of the coniferous swamp types, particularly those on muck soils and peat bogs. Some of the more common brush species are alder (*Alnus rugosa*), mountain maple (*Acer spicatum*), striped maple (*A. pensylvanicum*), raspberry (*Rubus* spp.) gooseberry (*Ribes* spp.), red-osier dogwood (*Cornus stolonifera*), Labrador-tea (*Ledum groenlandicum*), and honeysuckle (*Lonicera* spp.). Fortunately, coniferous tree species are usually able to grow up through the brush and eventually take over the site. The process is long and tedious, however, and many potentially productive years are lost.

Hardwood competition.—Many hardwood species seed and sprout aggressively on all swamp sites. They are mostly low-value species and must be considered as a threat to the value and productivity of the future stand. Red maple, black ash, paper birch, aspen, balsam poplar, elm, and scrubby yellow birch are some of the more common. Again, the problem is most serious on muck soil. The study of reproduction in uncut swamps referred to earlier clearly showed that the problem of hardwood competition is not introduced by cutting. Before cutting, hardwood seedlings or sprouts were dominant on 49 percent of the milacre plots examined in one stand and on 63 percent of the other stand. Cutting the stands only seems to aggravate the problem because the hardwoods respond to release more vigorously than the conifers and thus increase in dominance of the reproduction.

Wildlife.—The influence of wildlife on reproduction of swamp stands generally becomes a serious problem only when deer herds yard in areas where adequate regeneration of the stand is dependent on the cedar seedlings and layers. On occasion, however, snowshoe hares have severely injured as much as 25 percent of the cedar reproduction from 2 to 8 feet tall (*10*). Sometimes deer browse the red maple and some other broadleaved species heavily with resultant benefits to coniferous reproduction.

Reforestation of Denuded Swamps

About one-fourth of the coniferous swamp forests are not restocking naturally to coniferous species. If these areas, mostly denuded, are to become productive without a very long wait, they must be regenerated artificially. Because of the heavy growths of alder, willow (*Salix* spp.), Labrador-tea, and other brush species, brush control and site preparation probably hold the key to effective planting or direct-seeding operations.

Insects

The most serious insect threats to coniferous swamp management are the spruce budworm (*Choristoneura fumiferana*) and the larch sawfly. Many other insects attack these forests to some extent, but they are relatively unimportant. If epidemic attacks of the sawfly can be controlled, a serious effort should be made to convert much of the least productive swamp area to active production of tamarack. This may be one of the greatest opportunities to increase the overall production of the coniferous swamps.

The spruce budworm is potentially a considerable threat and has been found in epidemic proportions recently in a small area in the Keweenaw Peninsula. Prompt action was taken in controlling this outbreak. Some of the control measures advocated, such as cutting overmature balsam and increasing the amount of black spruce in the stand, fit in well with more general objectives of swamp management.

Although populations of larch casebearer (*Coleophora laricella*) have been declining in recent years, moderate to heavy feeding was reported in 1955 in numerous widely separated stands in the Upper Peninsula. The presence of a parasitic wasp (*Agathis pumilus*)

[4]Unpublished data from the Upper Peninsula Experimental Forest of the Lake States Forest Experiment Station.

may very well have a decided controlling effect; it has exerted a high degree of control in Lower Michigan.

Disease

Many rots cause considerable loss of volume in coniferous swamps, particularly in balsam fir and cedar. One of the most important is white stringy butt rot (*Poria subacida*), which attacks both these species. A survey in 1951 (*2*) showed that in the Upper Peninsula 35 percent of all balsam fir at age 60 was infected by this decay, and by 90 years the amount infected was up to 62 percent. The same study found that infection occurred 8 out of 10 times when the root was injured. Red heart rot (*Stereum sanguinolentum*) is a fast-growing heart rot of balsam fir which gains entrance through branch stubs and wounds. This rot is particularly bad on poor sites. Balsam butt rot or brown cubical rot (*Polyporus balsameus*), which also attacks cedar, is a slow-growing rot that extends only 3 to 4 feet up the tree but often makes the tree very susceptible to windfall.

Black spruce dwarf mistletoe (*Arceuthobium pusillum*), which causes witches-broom, attacks vigorous spruce, resulting in spike tops, a weakened condition, and often death. The disease is of consequence only in the black spruce swamps. The infection moves slowly, but now that fire protection is reducing the controlling effect of fire the disease will become more serious unless more direct controls are employed. Control measures now recommended for small patches of infection—up to a few acres—are to cut the spruce, including those trees in the surrounding area, to a depth of 1 chain beyond evident infection; on bigger areas all the larger trees and all the smaller infected trees should be cut.

The chief methods of reducing loss caused by insects and disease are salvage or sanitation cutting at short intervals, developing mixed stands wherever possible, reducing root and top injury to a minimum when logging, and harvesting the balsam fir at not later than 70 years.

Windthrow

One of the most frequently used arguments against partial cutting of swamp stands is that the residual stand is very likely to suffer heavy loss from windthrow (*4, 16*). Although such loss has undoubtedly been severe in some partially cut swamp stands, no data from swamp cuttings in the Upper Peninsula are yet available to determine the amount of loss or to relate it to intensity of cut. Windthrow has been greatly overrated as a cause of mortality in black spruce swamps in Minnesota. The resilient nature of the peat allows the roots to move considerably without actually tearing loose (*5*). Records of swamp plots of several types, cut heavily by the selection system 20 years ago, show that loss from windthrow has been very slight.[5]

Wind damage can be reduced by cutting balsam fir at a relatively low diameter; in fact, any fir tree larger than 8 inches d.b.h. is a poor risk with respect to wind. So, too, are very tall trees and trees showing evidence of rot or a weak root system (*8, 15*).

Drainage

No discussion of swamp management would be complete without mentioning the possibilities of swamp drainage. Studies have indicated rather clearly that draining swamps by a system of ditches can accelerate growth considerably (*3, 6*). The effect of the drainage on growth decreases rapidly as the distance from the ditch to the tree increases and thus makes adequate stand drainage for timber production prohibitive in cost. Drainage of swamps to accelerate growth of timber is, however, accepted as part of the intensive management practices in Finland. Recently, a new type of tool called the "Kesko-Oy plow" (*1*) has been developed in that country that promises to make construction of forest drainage ditches possible at a reasonable cost. Few of the wooded areas of the Upper Penninsula have been drained except near Seney where speculators constructed miles of ditches to drain land for sale to prospective farmers. The farms were soon abandoned, and a portion of the area was turned into the Seney Wildlife Refuge (*11*).

[5]Unpublished data from the Upper Peninsula Experimental Forest of the Lake States Forest Experiment Station.

Summary

To summarize briefly, the following points are reiterated:

1. The forest resource is absolutely vital to the economic well-being of the Upper Peninsula, and coniferous swamps are one of the most valuable segments of that resource.

2. Several separate cover types are included in these coniferous swamps, but for practical purposes they are best discussed and treated as a single, broad type, having considerable variation.

3. The chief value of these swamps is the production of pulpwood and cedar products. Their value as habitat for deer and other wildlife is also considerable.

4. Present cutting practices, in general, preclude the attainment of the maximum sustained yield that the swamps are capable of producing. Public and private foresters are currently engaged in cooperative efforts to develop improved cutting methods.

5. Reproduction of cutover swampland is generally adequate, but the composition of the new stand is greatly inferior to the original stand in most cases. The proportion of hardwoods has increased on all soil types. White-cedar and spruce are poorly represented in the reproduction on areas where they formerly grew best.

6. About one-fourth of the coniferous swamp forests are not restocking naturally to coniferous species. They are, in most cases, denuded and must be reforested artificially if a very long nonproductive period is to be avoided.

7. The spruce budworm and the

larch sawfly are the two most important insect enemies of these swamps. If sawfly epidemics can be controlled, one of the best opportunities to increase production on swamplands will be through converting unstocked or poorly stocked areas to tamarack wherever possible.

8. Many rots cause considerable loss of volume in coniferous swamps, particularly in balsam and cedar. Salvage or sanitation cutting at short intervals and harvesting balsam fir at not later than 70 years will reduce losses considerably.

9. Loss from windthrow after partial cutting is definitely a problem, but there are some indications that it may be overrated and the cause of more alarm than is justified.

10. Swamp drainage has been observed to accelerate tree growth on stagnant or extremely wet swamps. Although excessive costs have prevented any large drainage projects in the Upper Peninsula for forestry purposes a new tool, the "Kesko-Oy plow," offers some promise of reducing costs of drainage ditch construction.

The problems of managing Upper Michigan's coniferous swamps are complex, and their solution will require considerable study. However, the reward for developing management practices to meet these problems, as expressed in terms of a steady, increased production of high-value swamp products, will make the task well worth while.

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Ohio's Forests Surveyed

Although generally considered to be an agricultural and industrial state, Ohio is still 20 percent forested. Most of the state's 5.4-million-acre area of forest land is in the hill country bordering the Ohio River. Nevertheless, an impressive area of forest is scattered throughout the cornbelt and dairy region in the northern and western parts of the state. These and other details of the present forest situation in Ohio are presented in a report just published by the Central States Forest Experiment Station. Called "Ohio's Forests and Wood-Using Industries," the report contains the results of the most recent survey of the state's forest resource.

The report reveals that the average acre of forest contains 2,600 board feet of sawtimber. It is estimated that the present forest area could support two or three times that volume if properly protected and managed. Nearly all the timber produced in the state is hardwood; more than one-third of it is oak.

The report indicates that although Ohio is now growing more than twice as much wood each year as is cut, the state's wood-using industries still must import hardwood timber. The reason for this is that the forests are not producing the high-quality wood that the manufacturers demand, hence industry must look elsewhere for its source of supply. The authors point out that better forestry practices would eventually result in more and better wood being produced in Ohio's forests.

Copies of this report, authored by O. Keith Hutchison and James T. Morgan, can be obtained by writing one of the following: Central States Forest Experiment Station, 111 Old Federal Building, Columbus 15, Ohio; Ohio Division of Forestry, 1500 Dublin Road, Columbus, Ohio; or the Ohio Agricultural Experiment Station, Wooster, Ohio.

Factors Influencing Streamflow from Two Watersheds in Northeastern Pennsylvania

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This paper presents a striking example of the difference that forest cover, land use, and soil make in the streamflow from two watersheds that have similar climate.

THOUGH the factors that affect streamflow are well recognized rarely is it possible to find marked differences in streamflow from neighboring watersheds which can be related to differences in their physical features. An exception to this was recently noted in studying streamflow records of the tributaries to the Delaware. Two of these tributaries, the Lackawaxen and Lehigh, possessed decidedly different streamflow characteristics, characteristics which may be explainable in large part by conspicuous differences in land use and soils.

Location of Watersheds

The Lackawaxen River watershed is located almost entirely in Wayne County in the northeastern corner of Pennsylvania (Fig. 1). This watershed has an area of 290 square miles above the gaging site at Hawley, Pennsylvania. Twelve miles south of the Lackawaxen's southern boundary lies the Lehigh River watershed. It has an area of 322 square miles above the gage at Tannery, Pennsylvania, and occupies parts of four counties—Luzerne, Carbon, Lackawana, and Monroe.

Both watersheds are somewhat rectangular in shape (Fig. 1), and the Lackawaxen watershed tends to have a more dendritic drainage pattern. The Lackawaxen occupies a part of the Pocono Plateau. The elevation of its central plain ranges between 1,000 and 1,500 feet. Elevations range from 889 feet at the gaging station at Hawley to 2,000 feet along the western boundary.

The Lehigh River watershed is also located in the Pocono Mountains. Its elevation is somewhat higher than the Lackawaxen, ranging mostly between 1,500 and 2,000 feet. The elevation of the gage at Tannery is 1,059 feet. Both watersheds have numerous small lakes; a 1:250,000 topographic map shows 32 in the Lehigh watershed and 38 in the Lackawaxen.

Climate

The climate is similar in the two watersheds. Both have the cool summers and cold winters associated with high elevations in the Northeast. Average annual precipitation is 43.13 inches for the Lackawaxen watershed and 44.95 inches for the Lehigh watershed (*1*), and is well distributed throughout the year (*5*). Average January temperature for both is about 24° F. Average July temperature for the Lackawaxen is 67° F. and for the Lehigh 69 F° (*5*).

Streamflow

Average annual water yield for the 25-year period 1928-52 was 23.76 inches for the Lackawaxen and 27.89 inches for the Lehigh, equivalent to 1.75 and 2.05 c.s.m. (cubic feet per second per square mile), respectively.[2] The principal difference in streamflow, however, was the preponderance of maximum and minimum flows from the Lackawaxen watershed. For the 25-year record, the annual maximum daily flow of the Lackawaxen was greater than that of the Lehigh twenty times; for 24 of the 25 years the Lackawaxen had the lower annual minimum daily flow. Mean annual maximum and minimum flows and their standard deviations were as follows:

	Lackawaxen	Lehigh
	c.s.m.	c.s.m.
Maximum flow	27.7	21.9
Standard deviation	17.8	13.1
Minimum flow	0.15	0.27
Standard deviation	.07	.09

Mean annual maximum daily flow of the Lehigh was 79 percent of that of the Lackawaxen; mean annual minimum daily flow of the Lackawaxen was 56 percent that of the Lehigh. Standard deviations are about 60 percent of the maximum flow, and one-third and one-half of the minimum flow for the Lehigh and Lackawaxen, respectively. Maximum flow differences are significant at the 5-percent level, roughly twice the standard error of 2 to 3 c.s.m.; minimum flow differences are significant at the 1-percent level.

Comparison of daily maximum flows for about half of the 25-year record revealed discharges at different dates, which suggested that the greater flows from the Lackawaxen for these years could have been due to storm distribution in which the Lackawaxen watershed consistently received the heavier summer rainfalls. However, for the 13 years in which maximum flows of each watershed were recorded on the same date (and for which rainfalls of similar magnitude may be predicated), the Lackawaxen

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[2] Streamflow values were taken or computed from daily streamflow records published by the Geological Survey (*6*) and Pennsylvania Department of Forests and Waters (*3*).

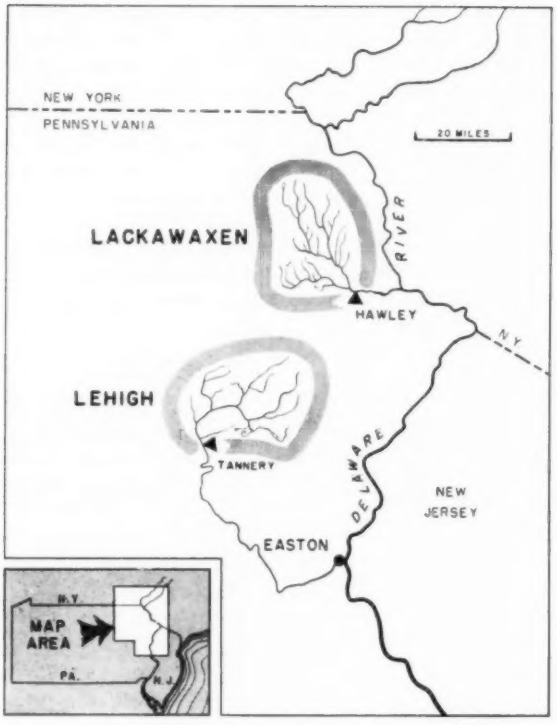

FIG. 1.—Location of the Lackawaxen and Lehigh watersheds. The distance between them is about 12 miles.

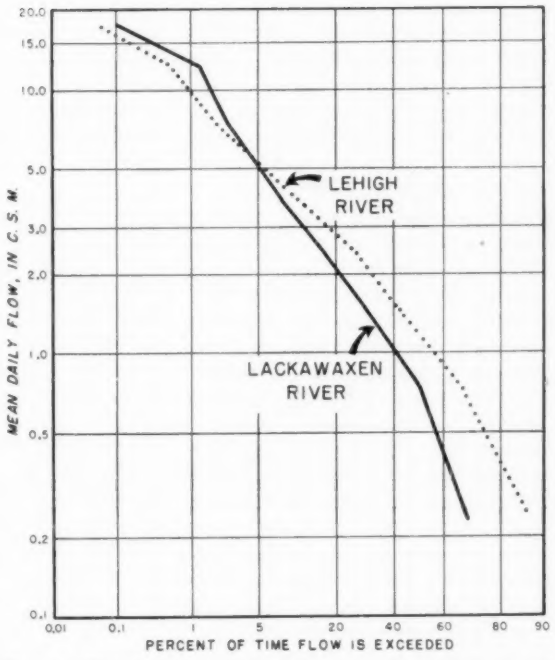

FIG. 2.—Flow-frequency distribution in the Lackawaxen and Lehigh watersheds.

had the greater flow 11 times. Among these 11 comparisons, the greatest daily discharge was on May 23, 1942, when a flow of 28,100 c.f.s. was measured in the Lackawaxen, as against 17,600 in the Lehigh; these flows are equivalent to 96.9 and 54.7 c.s.m., respectively.

For the 25-year period average minimum daily flows for 5-day periods of lowest annual flow varied from 21 to 79 c.f.s. for the Lackawaxen, averaging 42 c.f.s. or 0.14 c.s.m.; Lehigh values ranged from 38 to 173 c.f.s., averaging 98 c.f.s. or 0.30 c.s.m.

Differences in daily flow-frequency distribution are illustrated in Figures 2, based on the 5-year period 1948 to 1952. The minimum value plotted, 0.25 c.s.m., was exceeded 69 percent of the time by Lackawaxen streamflow and 87 percent of the time by Lehigh flow. With larger flows, differences were smaller; flows of 6.0 c.s.m. and larger were exceeded more frequently by the Lackawaxen. Average flow at 50-percent frequency was 0.75 c.s.m. for the Lackawaxen and 1.21 for the Lehigh.

No one season had a preponderance of high flows. However, the number of daily flows at various ranges indicate that higher flows occurred in the Lackawaxen in the spring during the 25-year period (Table 1). Spring flows over 16 c.s.m. occurred more than twice as frequently from the Lackawaxen as the Lehigh—38 in number as compared to 18.

A correlative and timely comparison was made possible by the publication of streamflow records collected during the hurricanes of August 1955 (7). Almost identical maximum discharges were recorded for these two watersheds: 179 c.s.m. for the Lackawaxen and 181 c.s.m. for the Lehigh. During the 15-day period of maximum discharge, August 12 to 26, mean daily flows respectively were 16.4 and 14.9 c.s.m. Total rainfall received during the two storm periods, August 11-15 and 17-20, was greater in the Lehigh: from rainfall distribution estimates the Lackawaxen watershed received about 12 inches of rainfall and the Lehigh about 18. As noted, however, maximum flows from the Lehigh were not greater—further evidence of its tendency to have the lower maximum flows for a storm of given size.

Land Use

A major difference between the two watersheds is the amount of land devoted to agriculture. In topography and soils the Lehigh

TABLE 1.—COMPARISON OF STREAMFLOWS IN THE LACKAWAXEN AND LEHIGH WATERSHEDS DURING 25-YEAR PERIOD

Range of flows (c.s.m.)	Winter (Dec., Jan., Feb.)		Spring (Mar., Apr., May)		Summer (June, July, Aug.)	
	Lackawaxen	Lehigh	Lackawaxen	Lehigh	Lackawaxen	Lehigh
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
5-10	85	100	222	228	33	40
11-15	22	8	53	41	11	9
16-25	8	9	27	12	6	8
25+	0	0	11	6	3	5
Percent of total	24	25	65	62	11	13

watershed is less suitable for farming; 7 percent of this watershed is devoted to agriculture, and 93 percent is forested.[3] In the Lackawaxen watershed the soils are more fertile and the topography is better suited to agriculture; here 39 percent of the area is open land, and 61 percent is forested.

These differences in land use could well contribute in part to the differences in streamflow noted. As a general rule, streamflow is flashier from agricultural drainages than from comparable forested areas, because the reduction in infiltration from soil cultivation or compaction by livestock tends to give both higher storm discharge and, consequently, lower base flows. Also, it has been observed that impervious soil freezing is much more frequent and widespread in cultivated or pastured areas than in forested areas—which may well account for the greater number of maximum flows in the spring from the Lackawaxen.

Differential effects of land use were borne out by observations made in the Lackawaxen and Lehigh watersheds during a January rainstorm that followed a short period of sub-freezing temperatures. Streams in the Lackawaxen drainage were flowing nearly bank-full and quite turbid, while Lehigh streams were clear and showed little rise in stage. Muddy water was observed running off pastures, while no surface runoff was occurring on adjacent forested areas. Soils in cultivated and pasture areas were frozen hard and impervious, while forest soils were unfrozen.

[3]Northeastern Forest Experiment Station; Forest Survey data.

Soil Differences

Perhaps a more elemental reason for the streamflow differences, and certainly the basis for the differences in land use, are the differences in soils. Soils in both watersheds were derived from glaciated shale and sandstone. In the Lackawaxen watershed they consist of the Culvers, Mardin, and Volusia series, soils with compact substrata at shallow depths that are impervious to moisture and provide little storage capacity for rain or melting snow (*4*). They consist of stony loam and gravelly silt loams that are moderately fertile.

In the Lehigh watershed the soils are infertile stony loams and stony sandy loams. Most sloping areas are moderately well to well drained, and poorly drained flats are extensive. The principal soils include: Wooster—deep, well drained; Bath—deep, well drained; Mardin—deep, moderately well drained; Chippewa—deep, very poorly drained; and Lordstown—shallow to bedrock, well drained (*2*).

The predominance of poorly drained soils in the Lackawaxen watershed would tend to give a flashy character to its streamflow as compared with streamflow from the Lehigh with its better drained soils. Thus the marked differences in peak and minimum discharges and in streamflow distribution may be logically charged in part to major differences in land use and in part to major soil differences, the streamflow record serving to integrate these rather complex relationships.

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New Timber Figures for the Lake States

The latest information on the forest resources of Minnesota, Wisconsin, and Michigan has been compiled and published by the Lake States Forest Experiment Station in St. Paul. Estimates of forest area, timber volume, growth, annual cut, area planted, and many other items of interest to timber owners and users are included in the report according to M. B. Dickerman, director of the Station.

The information was first compiled for the National Timber Resource Review, completed in October 1955. More detailed figures for the Lake States forests were added and the whole published as a statistical summary for the region.

Forests cover 55 million acres in the Lake States, 45 percent of the land area. Far from being a vanishing resource, timber volumes are building up as growth exceeds cut for nearly all species. The trouble is that the second growth stands are frequently inferior to the old growth in stocking and in quality of timber.

Forest conditions are constantly changing, Mr. Dickerman emphasized in announcing the report. No inventory of the region's timber is ever completely up to date because timber growth and use go on all the time. The forest surveys conducted by the Station and its cooperators in the three states are a continuing job. The objective is to make solid estimates available as often as possible, to help in the planning of both public and private agencies concerned with forest resources.

Copies of the report entitled "Lake States Timber Resources" can be obtained from the Lake States Forest pus, University of Minnesota, St. Paul Experiment Station, St. Paul Cam-1, Minn.

Mechanized Thinning in Jack Pine Saplings

R. C. Dosen, J. H. Stoeckeler, and F. G. Kilp[1]

As forestry in the Lake States becomes more intensive, forest managers will give more and more attention to precommercial thinning of young stands to concentrate the growth on fewer trees, and to obtain more uniform spacing. This type of thinning yields no immediate return and since costs, like those of planting, must be capitalized, they must be held to a minimum consistent with effectiveness of the operations.

In the past, hand methods of thinning with machetes, brush knives, axes, and similar handtools have required as many as 17 to 22 man-hours per acre in pine sapling or advanced reproduction stands where the number of stems may range from 4,000 to 13,000 per acre. With current woods labor rates in Wisconsin running as high as $1.20 to $1.40 per hour, such thinning operations become prohibitively expensive, and some means must be sought to slash costs.

In a joint attack on this problem in 1948, the Nekoosa-Edwards Paper Company and the Lake States Forest Experiment Station started a series of experiments involving several aspects of thinning and its mechanization.

The Case for Thinning

The industrial forest properties of the Nekoosa-Edwards Paper Company on which thinning is being done are in central Wisconsin south of Wisconsin Rapids. The predominant forest types are jack pine and scrubby northern pin oak, with the species often occurring in mixture. These species are present because of fires that occurred frequently up to about 1920. The soils are outwash sands of the Plainfield and Coloma series. Topography is level to slightly undulating, the terrain is free of surface rocks or boulders, and windfall is scarce—ideal conditions for the use of mechanical thinning equipment.

Much of the jack pine in the area is in the age range of 10 to 30 years. Often it grows in very dense stands, resulting in spindly, slow-growing trees. To aggravate the situation further, winter precipitation often occurs in the form of wet snows or occasionally as sleet. When this lodges on the trees they break off or, more generally, bend over to such a degree that many of them never straighten up. This results in patchy, irregular stocking and wasted growing space with some spots too dense and others too thinly stocked. The loss in potential production is estimated as being at least 3 cords per acre for a rotation age of 50 years, with a stumpage value of about $5 per cord.

The high risk involved with unthinned, dense stands, and the prospects of higher yields and of shortening the rotation age by as much as 5 or 10 years by thinning are impelling motives for early treatment of the stands.

A further incentive for increasing production by thinning of stands within close proximity of the paper mill is the increasing cost of freight on wood from distant markets. This may amount to as much as $10 to $13 per cord for pulpwood cut in northern Minnesota and hauled to central Wisconsin by rail. Every cord of increased local wood production thus may save the mill as much as $15 to $18 if one takes into consideration both freight savings and increased stumpage values. The assumption would not be justified in a situation of abundant, self-sufficient local wood supply but such a situation just does not exist in central Wisconsin.

The average cost of thinning obtained on 2,540 acres of overstocked jack pine in the past 2 years was $8.71 per acre. If a rather modest gain in production of three cords per acre is assumed in the rotation, the original thinning cost per cord of $2.90 carried at 4 percent compound interest for 30 years is $9.40 per cord. This is substantially less than the $15 to $18 saving per cord cited above, and would seem to provide ample justification for the noncommercial thinning.

Additional refinements in mechanization, resulting in a further decrease in costs, will probably widen the margin in favor of thinning, as will increasing trends in price of stumpage purchased on the open market.

Viewed from a regional standpoint, thinning looms up as a major problem since there are about 1 million acres of medium and well-stocked sapling jack pine in the Lake States of which at least half probably requires thinning.

Past Records of Stand Behavior in Thinned and Unthinned Stands

In 1948 a number of experimental thinnings were installed on the Nekoosa-Edwards Paper Company Industrial Forest to provide leads on thinning response. These were remeasured 5 years later. In one test eight 1/20-acre permanent sample plots with buffer strips were installed; half of the plots were thinned and half were left unthinned. Treatment reduced the

[1]Messrs. Dosen and Kilp are forester and woodlands manager respectively of the Nekoosa-Edwards Paper Company, Port Edwards, Wis.; Dr. Stoeckeler is a forester of the Lake States Forest Experiment Station. The Station is maintained by the Forest Service, U. S. Department of Agriculture, at St. Paul 1, Minn., in cooperation with the University of Minnesota.

sapling stand from around 5,000 to 1,500 trees per acre.

Diameter growth rate and resistance to bending by sleet or snow was directly associated with the sturdiness of the stem and the percent of total tree height in living crown.

Trees with 10 percent of total height in live crown were making only 0.25 inch of diameter growth per decade, and those with 20 per cent only 0.60 inch per decade (Fig. 1). Growth of trees with 30 percent or more in live crown was over 1 inch per decade—a satisfactory growth rate for this site.

In unthinned stands only 32.0 percent of the trees had a satisfactory live crown ratio, i.e., 30.0 percent or more of stem in live crown, while stands measured 5 years after thinning had 84.5 percent of the trees satisfactory in this respect.

The growth data, expressed in terms of growth rate per decade by crown classes, are shown in Table 1. The ratio of diameter growth rate in thinned to unthinned stands is 1.29:1. It was observed in this particular thinning experiment that the crowns in the thinned stand still appeared to be improving in crown depth relation to total height, and from present trends probably a 10-year period will be required after thinning before its full impact is felt.

TABLE 1.—COMPARATIVE GROWTH RATE IN THINNED AND UNTHINNED STANDS OF 23-YEAR-OLD JACK PINE IN CENTRAL WISCONSIN

Crown class before thinning	Diameter growth rate per decade[1]	
	Thinned Inches	Unthinned Inches
Dominant	1.52	1.10
Codominant	.80	.66
Intermediate	.60	.32
Suppressed	.40	.16
Weighted average	.80	.62

[1]Data are based on a 5-year remeasurement, but for the sake of convenience are put on a per-decade basis. Of the 176 trees in the sample, 76 were from thinned, and 100 from unthinned plots.

The considerable period of time required for crown building by dense young stands more than 15 years old has led to a policy of thinning the young stands when they are as little as 5 to 15 years old. At this younger age the trees still have reasonably good crown depth and comparatively good diameter in relation to total height, making for a more sturdy tree better able to withstand snow bending.

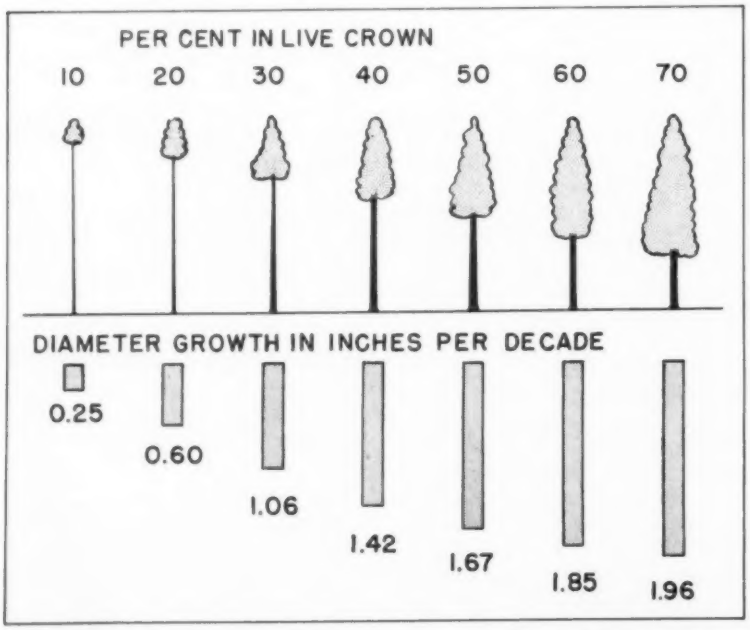

FIG. 1.—Growth rate in relation to live-crown percent as observed in thinned stands of dense sapling jack pine on low-medium site in central Wisconsin.

This difference in snow resistance is understandable when the form and taper of planted trees are compared to those of natural trees from dense clumps. Snow damage has been virtually negligible in jack pine plantations in central Wisconsin. In dense natural stands it is often high.

Part of the impetus in growth due to thinning came about from removal of inferior oak competing with the jack pine. This is of importance, because in the unthinned stands the dominant class of the scrubby oak was growing faster in diameter (1.28 inches per decade) than the dominant class of jack pine (1.10 inches per decade).

Mechanical Thinning

Tests of various methods of mechanical thinning were begun in 1948 on a 2,540-acre stand of jack pine reproduction and saplings in central Wisconsin. In 1954 and 1955 a large-scale pilot-plant operation was performed, based on experience obtained in the smaller experiments. These tests are described below.

In 1948 a 6-foot-wide Athens disk pulled by a TD-6 International tractor was used to thin a dense stand of 4-inch-diameter jack pine near Port Edwards, Wisconsin. Swaths were cut every 6 feet. Thus, an opening every 6 feet alternated with a strip of trees 6 feet wide. This method proved to be unsatisfactory for various reasons. Primarily, it was nonselective and took down crop trees in the path of the disk. Trees along the edge of the strip were root pruned and often bruised by both tractor and disk, and larger trees in the swath were bent over and often partially uprooted, leaving them highly susceptible to invasion by the Ips bark beetle. The cost of the operation, including tractor, disk, and one man, was $13.61 per acre.

During the same year a self-propelled circular saw called the Little Giant Tree Feller was used. This is equipped with a 36-inch circular saw, a 2-cylinder Wisconsin motor, 19-inch wheels, and both a forward and reverse gear, and

develops 14 horsepower.

This saw was run back and forth in irregular swaths spaced at 5- or 6-foot intervals. Cutting was selective and only inferior trees were removed, thus leaving the dominant and codominant crop trees. This method left a much more uniform stand than did the disk. A two-man crew was used, with one man cutting the trees with the saw and the other pulling them aside with a pike pole. Costs per acre on a medium-stocked jack pine stand with a diameter range of 1 to 4 inches amounted to $7.19 per acre.

In the past few years an additional type of circular saw has been used, namely, the Lowther General Purpose saw (Fig. 2). This has a 1-cylinder Wisconsin motor that generates 2-3/4 to 3-1/4 horsepower. A 26-inch circular blade is run by two "V" belts on a motor-to-saw pulley arrangement. The wheels are 14 inches in diameter and the machine has only a forward speed.

This saw readily cuts pine to 6 inches in diameter, and is extremely selective and easy to use. The lack of a reverse gear on the saw is not too detrimental to operation as the unit is light enough to be handled manually when backing up is necessary. In the tests, it was used in much the same manner as the larger Little Giant Tree Feller. Swaths were cut east to west and north to south, leaving a checkerboard pattern. Because one man can work alone, the costs were somewhat lower—$6.82 per acre on stands averaging 3,100 stems 1 to 5 inches in diameter.

A new type of portable, one-man, brush-cutting saw was tested on dense, small-diameter stocking. These saws, of which there are several models on the market, are suspended in a sling from the operator's shoulder. A shaft extends from the motor and is geared to a circular blade at the end of the shaft (Fig. 3). One model has an attachable chain-saw head that is advantageous in cutting larger diameter jack pine and oak. Stands 5 to 15 years old can be thinned to a 6x6-foot spacing in a short time. Thinning costs on small-scale trials for both the Brushmaster and the Sawette—the types of sling saws used—were approximately the same, namely, $7 per acre.

In the large-scale, pilot-plant operation conducted during 1954 and 1955, a combination of the above-mentioned saws was used over areas of dense jack pine and oak ranging in diameter from 1 to 5 inches.

Four Lowther General Purpose self-propelled circular saws, 2 Brushmasters, and 2 Sawette saws were used. Nine men made up the crew, one man on each of the saws and a crew boss who directed the work, made minor repairs on the equipment, filled the saws, and also kept track of the acreage covered and time involved. The four Lowther self-propelled saws worked the frontal part of the area to be thinned, checkering and doing a selective thinning of the suppressed stocking; their cutting was confined to the larger diameter trees. Four men, each with a brush-type sling saw, followed doing a refining job, cutting the smaller diameter trees, and correcting the spacing of the residuals to 6x6 feet. The crew boss outlined the area to be cut and then, when not otherwise engaged in sharpening saws or repair work, followed the crew, pushing the "leaners" to the ground and, using a small hand axe, felling a tree that was occasionally missed.

This combination of a semi-rough treatment of the stand with the larger wheeled saws followed by a refining treatment with the more mobile sling saws was best adapted to the large-scale thinning operation to give a uniformly satisfactory job at reasonable cost and with the least amount of fatigue to crews. The crew was able to average 13.6 acres in an 8-hour day at an average cost of $8.71 per acre.

Continued use of this equipment through 1955 has led naturally to adaptations and variations in the general work plan. The first tests with the sling-type saw indicated that it was suitable only for the 1- and 2-inch diameter trees. Adjustments of the set of the saw blades, however, allowed these saws to cut easily pine and oak up to 6 inches in diameter with no undue stress on the motor or excessive maintenance and repair.

From initial trials of thinning done entirely by Brushmaster saws in 5- to 12-foot-high jack pine, it is evident that on a large-scale operation fairly dense young stands in moderately rolling terrain (not

FIG. 2.—A self-propelled 26-inch circular saw used for swath thinning.

FIG. 3.—Portable one-man circular saws used in thinning dense jack pine.

suitable for the use of self-propelled saws) can be thinned at a rate of 5 to 6 man-hours per acre, including time for saw maintenance and repairs. In hand thinning with brush knives or machetes, the expenditure in terms of man-hours in timestudy trials was 2.5 times as high per 1,000 stems removed as thinning with the hand-carried power saw.

Hence, these saws may prove useful in some types of terrain where undulating or moderately rolling topography, the presence of a considerable amount of rock on the surface, or windfall preclude the use of the large self-propelled Lowther saws.

Power saws of the type described can be the source of serious accidents, and care should be taken to avoid having men work too close to each other. Each man should be assigned a sequence of strips or zone of operation in which to use his piece of equipment. All should be required to wear shin guards and hard hats.

Summary

The high risk involved with unthinned jack pine stands, the prospects of increased yields through proper utilization of growing space, and the shortening of the rotation period, plus the elimination of freight costs from distant areas make the noncommercial thinning of young stands in areas near mills an attractive possibility.

Large-scale mechanical thinning of 2,540 acres of dense reproduction and saplings of natural jack pine in central Wisconsin was done at a cost of $8.71 per acre. This represents a 50 to 60 percent reduction in costs compared with hand thinning done with axes, brush knives, or machetes.

The mechanical thinning was done by swathing the stand in both directions at about 5- to 6-foot intervals with a self-propelled Lowther General Purpose saw equipped with a 26-inch circular saw. Thereafter, finishing touches were made by thinning out the residual stand with hand-carried portable one-man saws equipped with an 8- or 10-inch circular saw or with a chain-saw head.

A live-crown total-height ratio of trees was used as a basis for selecting trees to be left. Favored trees were those with 30 percent or more of total height in live crown. The stands were not marked before cutting; instead, crews were trained in selection of the type of trees to leave. This eliminated marking costs.

Opening For Forestry Teacher In Liberia

A school of forestry was established at the University of Liberia two years ago. Subsequently, at the request of the Liberian government the Food and Agricultural Organization of the United Nations assigned two German foresters to handle the instruction. One of these foresters, Dr. F. A. Querngaesser, the director, is staying on. The other will leave during the summer.

Qualified American foresters may apply for the assistant professorship. The incumbent will teach some mathematics and technical forestry courses, particularly forest surveying, mensuration, and perhaps silviculture.

The salary is about $6,000 with living quarters furnished. The incumbent will receive transportation to and from Liberia for himself and family. Any young teacher who can obtain a year's leave of absence from his present position might find this an interesting experience.

Interested persons may send information about themselves, including education, experience, family, etc., to the Society of American Foresters, 425 Mills Building, Washington 6, D. C. prior to April 1. The Society will transmit the information to the appropriate authorities. The Society cannot enter into correspondence with applicants or provide additional information, as the Society's participation must be limited to serving as an intermediary only.

It is possible that similar teaching positions in other countries may become available.

Sampling for Height-Diameter Relationships[1]

J. W. Ker and J. H. G. Smith[2]
University of British Columbia, Vancouver

IN THE ASSESSMENT of forest stands, both direct and indirect measurements are often necessary. Measurements obtainable directly, such as the diameter of a tree at breast height, are relatively inexpensive and least subject to error. On the other hand, measurements that must be obtained indirectly, such as tree height, often are difficult and expensive to obtain, and are subject to more and larger errors.

Thus in sampling forest stands it is customary to measure or estimate the d.b.h. of every tree in a sample and to measure the height of only a few. The objective in taking the heights of a sub-sample of trees is to obtain, at reasonable cost, an adequate representation of the true relationship existing between tree height and d.b.h. This relationship may then be used to describe the stand or to derive tree and stand volumes from a standard volume table.

Assuming that all trees on a sample plot are measured for d.b.h., the number of sample-tree heights required to provide a stand-volume estimate of given precision will be governed, among other factors, by the following considerations:

1. The number of species present.
2. The precision of a single tree-height measurement.
3. The variation in tree heights.
4. The degree of correlation of tree height with d.b.h.
5. The efficiency attained in fitting a curve to the height-d.b.h. relationship.

The first factor, the number of species present, cannot be altered, but data for tree species with similar height-diameter relationships may be combined. For instance, one set of height-diameter curves may prove suitable for both western hemlock and amabilis fir.

The precision of the height measurement may be controlled through adequate training of suitable personnel, through care in the adjustment and use of the height-measuring instrument, and through appropriate supervision and checking of field work. Ker (*3*) reported standard errors of single-tree-height estimates of 1.4 percent for immature Douglas-fir and 2.3 percent for hemlock trees, using percent Abney and 100-foot tape. Recent tests carried out by J. H. G. Smith with undergraduate forestry students in the same stands, using various instruments, are summarized in Table 1. As the trees were open-grown, tops and bottoms of each tree were clearly visible. Percent scales were used at a horizontal distance of 100 feet in each case. Consequently these data may be considered representative of variations inherent in student work under near-optimum conditions.

The variation in tree heights for a given species is unimportant provided that it occurs between rather than within d.b.h. classes, and therefore may be expressed by a height-diameter curve. Variability of height within d.b.h. classes in a stand is usually attributable to the position attained by the tree within the crown canopy.

Advantages of the parabolic expression of height-diameter relationships over other formula methods were reported by the authors (*1*). This method employs a short-cut approximation of the least-squares solution of the equation: $H = 4.5 + bD - cD^2$,

where H = total height of tree in feet,

D = tree d.b.h. in inches,

and b and c are constants.

This provides a quick, consistent, and accurate procedure for curve-fitting wherever an adequate sample of height-diameter measurements is available.

Little attention, however, has been given to determining how many and what kind of sample heights constitute an adequate sample. Bruce and Schumacher (*2*, p. 158) point out that in drawing a sub-sample of heights it is unnecessary to sample all trees in the stand at random, that it is not only permissible but desirable to limit the sample heights to specific diameter classes, provided that the selection of sample trees from within those classes is not biased.

Trorey (*5*) recommended measuring tree heights in only two d.b.h. classes, the one toward the upper limit of the range in diameter, the other one-half that diameter. Alexander (*1*) modified Trorey's method for application to permanent sample plots on which many or most trees in all d.b.h. classes had been measured for height. The authors (*4*) have reported on various modifications of the parabolic method that provide satisfactory results. This paper concerns a test of the effectiveness of using varying amounts of data to predict the height-diameter relationship of an entire sample drawn from a number of stands.

Total heights and diameters at breast height were available for 181 sample trees. These trees had been measured to establish height-diameter relationships for 15 permanent sample plots in a 65-year-old stand on the University Research Forest at Haney, B. C. Douglas-fir trees were sorted into five site-index groups ranging from 135 to 157 feet at 100 years. Trees of three other species, viz., western hemlock, western redcedar, and

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[1]Research Paper No. 15, Faculty of Forestry, The University of British Columbia, Vancouver, B. C.

[2]Respectively, associate professor and assistant professor, Faculty of Forestry, The University of British Columbia.

Data were analyzed by K. Maezawa under the direction of J. H. G. Smith.

amabilis fir, were assumed to have one height-diameter relationship each. Measurements in the five site groups of Douglas-fir and in the three other species provided a total of 8 groups of data for comparison of free-hand curves with those of the parabolic height-diameter equation as fitted by the short-cut approximation of the least-squares solution.

In an attempt to determine what constitutes an adequate sample of heights and diameters for compilation of tree volumes and other data required in the analysis of a sample plot, six sub-samples were drawn in the same way from each of the eight groups mentioned above. From each sub-sample, b and c were calculated as required in the height-diameter equation $H = a + bD - cD^2$ (see footnote after Tables 2 and 3). Standard errors of estimate (SE_E)[3] were calculated for free-hand curves drawn using the data in each group. Similar values were calculated for each sub-sample by use of estimates of b and c for regression coefficients with the net sum of products of all heights and all diameters in each of the eight groups. Then the portion of the net sum of squares of height that was removed by b and c of any sub-sample was: b (net sum of products HD) $-$ c (net sum of products HD^2) which we may call K. The standard error of estimate for each sub-sample taken within the heights and diameters characterizing each group was calculated as: the square root of

$$\frac{\text{(the net sum of squares H)} - K}{N-3}.$$

As a matter of interest the coefficients calculated from sub-samples of each group were also used to express the height-diameter relationships for all trees in all eight groups. Standard errors of estimate are given in Table 2 for the sub-sample estimate of the group and in Table 3 for all groups.

Analysis of the standard errors of estimate in Tables 2 and 3 shows that very good results have been secured in sub-sample (a), by taking only the two smallest and the two largest trees in d.b.h. By this method the smallest standard errors of estimate were secured when the range in d.b.h. was large. The average d.b.h. of the two small trees expressed as a ratio of the average d.b.h. of the two large trees is strongly correlated with the standard error of estimate. These ratios and the rank of the standard error of estimate of each group from lowest (1) to the highest are tabulated below:

Minimum d.b.h.'s/Maximum d.b.h.'s	.31	.35	.37	.42	.42	.48	.50	.57
Rank of SE_E from 1 to 8 in Table 2	1	1	5	2	3	5	6	7
Rank of SE_E from 1 to 7 in Table 3	1	1	4	2	4	4	6	7

From the above it seems reasonable to conclude that good results will be secured from measuring the heights and diameters of two large-diameter trees and two trees approximately 30 percent of the d.b.h. of the large trees.

It is evident that in most cases an increase in number of trees used in the calculation of the height-diameter curve is not accompanied by a reduction in the standard error of estimate. But considerably more study is required to determine the optimum distribution and intensity of samples of tree heights.

In conclusion, it should be noted that in many cases the standard errors of estimate secured from the free-hand curves are larger than those of the short-cut approximation of the least squares solution of the parabolic height-diameter curve. Other shortcomings of the free-hand method are inconsistency of results and the need for a large number of height observations over the entire range of diameter before a curve can be drawn. The method suggested

TABLE 1.—STANDARD DEVIATIONS OF TREE-HEIGHT MEASUREMENTS MADE WITH SEVERAL INSTRUMENTS

Tree no.	1	2	3	4	5	6	All trees	
Species[1]	H	H	F	F	H	F		
Average height, feet	73	72	132	134	93	107	102	
Instrument	Standard deviation, feet (16 measurements)							
Abney level	3.6	1.8	3.1	2.1	1.8	2.0	2.44	
Haga height-finder	1.1	2.5	2.3	1.6	1.5	1.6	1.77	
Spiegel relaskop	2.8	2.8	2.3	1.7	2.8	2.1	2.45	
Student number	1	2	3	4	5	6	7	8
Student group	Standard deviation, feet (18 measurements)							
1	2.2	3.0	1.5	2.0	1.1	1.0	1.5	1.1
2	1.5	2.1	3.1	2.5	1.5	2.2	2.4	1.0

[1]H—hemlock, F—Douglas-fir.

[3] $SE_E = \sqrt{\frac{S\,(H-Hc)^2}{N-2}}$, where H is the actual height, Hc is the curved height and N is the number of observations in a sample.

TABLE 2.—STANDARD ERRORS OF ESTIMATE OF HEIGHT FOR INDIVIDUAL GROUPS COMPUTED FROM SUB-SAMPLES.

Sample[1] group	Sub sample a	b	c	d	e	f	g	h	No. of trees	Species
	Standard error of estimate (ft.)									
1	6.3	11.3	12.9	11.5	9.9	13.3	10.0	7.9	18	Douglas-fir
2	9.7	11.3	14.0	7.2	10.2	2.3	7.5	7.6	14	Douglas-fir
3	4.7	4.7	8.2	5.2	4.4	3.3	6.7	6.8	26	Douglas-fir
4	5.9	15.3	17.1	4.6	4.0	10.6	5.6	4.9	8	Douglas-fir
5	6.9	5.3	8.1	4.6	6.1	4.3	5.4	6.0	14	Douglas-fir
6	5.3	11.3	11.6	6.0	14.6	7.9	12.8	13.7	16	Western redcedar
7	7.2	11.1	8.8	9.6	6.9	10.6	9.6	9.2	65	Western hemlock
8	8.2	7.1	9.0	5.6	5.8	6.3	7.8	8.5	20	Amabilis fir
Totals	54.2	77.4	89.7	54.3	61.9	58.6	65.4	64.6	181	
Total number of trees used	32	40	80	91	61	45	181	181		

[1]See footnote to Table 3.

TABLE 3.—STANDARD ERRORS OF ESTIMATE OF HEIGHT FOR ALL TREES COMPUTED FROM GROUP SUB-SAMPLES

Sample[1] group	a	b	c	d	e	f	g
	Standard error of estimate (ft.)						
1	6.8	9.4	10.7	9.9	9.0	10.9	9.1
2	12.2	13.5	16.0	10.7	12.9	7.9	10.9
3	12.9	12.5	16.0	12.8	8.0	11.2	14.1
4	7.1	9.6	10.6	7.0	6.5	5.9	7.5
5	19.2	17.0	10.1	15.7	17.8	15.6	16.7
6	9.1	11.1	11.0	9.4	11.5	10.0	11.8
7	8.5	15.8	11.1	12.6	8.1	14.4	12.6
8	12.5	11.5	13.9	8.6	8.9	9.8	11.9
Totals	88.3	100.4	99.4	86.7	82.3	85.7	94.6
Total no. of trees used	32	40	80	91	61	45	181

[1]The sub-samples comprised the following trees within each group:
(a) The two of smallest d.b.h. and the two of largest d.b.h.;
(b) The one of smallest d.b.h. and the four of largest d.b.h.;
(c) The two of smallest d.b.h. and the eight of largest d.b.h.;
(d) Every second tree from largest d.b.h. to smallest;
(e) Every third tree from largest d.b.h. to smallest;
(f) Every fourth tree from largest d.b.h. to smallest;
(g) All trees, using approximate least-squares fit;
(h) All trees, using free-hand curve.

above, which minimizes the collection of expensive height data, merits further investigation.

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SCHOOL BOX SCORE 1957 MEMBERSHIP

School	Student applications received Mar. 1957	Total 1956	Total 1957
Alabama Polytechnic Institute	0	6	19
University of California	0	53	6
Colorado A & M College	4	28	8
Duke University	0	7	2
University of Florida	1	25	4
University of Georgia	2	30	43
University of Idaho	0	21	2
Iowa State College	5	31	9
Louisiana Polytechnic Institute	0	27	0
Louisiana State University	3	22	12
University of Maine	0	13	10
University of Massachusetts	0	20	0
Michigan State University	0	50	5
University of Michigan	4	24	7
University of Minnesota	5	26	21
University of Missouri	0	2	35
Montana State University	3	17	33
State University of New York	5	38	20
North Carolina State College	0	24	1
Oregon State College	3	44	11
Pennsylvania State University	0	35	10
Purdue University	1	36	2
Utah State Agricultural College	2	28	4
University of Washington	2	21	11
West Virginia University	1	5	17
Yale University	1	13	5
Totals	42	646	297

SECTION BOX SCORE 1957 MEMBERSHIP

Section	Applications received[1] Mar. 1957	Total 1956	Total 1957
Allegheny	3	58	34
Appalachian	2	58	6
Central Rocky Mountain	4	32	12
Central States	3	42	5
Columbia River	6	77	18
Gulf States	3	79	15
Inland Empire	0	32	2
Intermountain	2	35	4
Kentucky-Tennessee	0	12	3
New England	1	61	20
New York	7	45	24
Northern California	0	67	6
Northern Rocky Mountain	4	31	34
Ozark	0	19	39
Puget Sound	6	44	18
Southeastern	6	92	77
Southern California	0	2	1
Southwestern	0	2	0
Upper-Mississippi Valley	11	72	33
Washington	2	1	5
Wisconsin-Michigan	6	102	17
Totals	66	963	373

[1]Students, Junior, Affiliate, Associate (Initial) grades only.

Consistency of Bud Bursting in Douglas-Fir

William G. Morris, R. R. Silen and H. Irgens-Moller[1]

POSSIBILITY OF STRONG genetic control over time of bud bursting in Douglas-fir has been suggested by recorded observations extending over a period of 22 years. If more detailed studies now under way bear out these observations, the knowledge will have important application in selecting seed for planting forest lands in the Douglas-fir region of the Pacific Northwest.

Records taken since 1933 on three plantations in Oregon and Washington indicate that relative order of vegetative bud bursting is constant between progenies from widely separated seed sources growing in the same plantation. This relationship apparently holds true regardless of altitude of plantation, date when growing season began, or stand age. Repeated observations of individual wild trees have further shown that naturally seeded trees growing side by side burst their buds at different dates but in about the same order year after year.

Growth of a Douglas-fir tree both in height and in branch elongation is resumed each spring from the dormant buds formed the previous growing season. If freezing temperatures occur when the buds are in the tender, freshly opened stage, they are usually damaged and no growth occurs that year. Late bud bursting protects a tree against this damage.

Time of bud bursting in relation to spring frosts is therefore important to tree growth. If late-bud-bursting trees transmit this characteristic to succeeding generations, their progeny can be planted to advantage in areas where late spring frosts are likely to occur. Observations in the early 1930's showed that tardiness in beginning annual growth apparently does not lessen a tree's chance of making the same height growth as one having an early start.

Study Areas and Early Observations

In 1915, plantations were established at Wind River, Washington, at an elevation of 1,100 feet, and near Mt. Hood, Oregon, at elevations of 2,800 and 4,600 feet (Fig. 1). Seed for these plantations came from 120 parent trees at 13 differ-

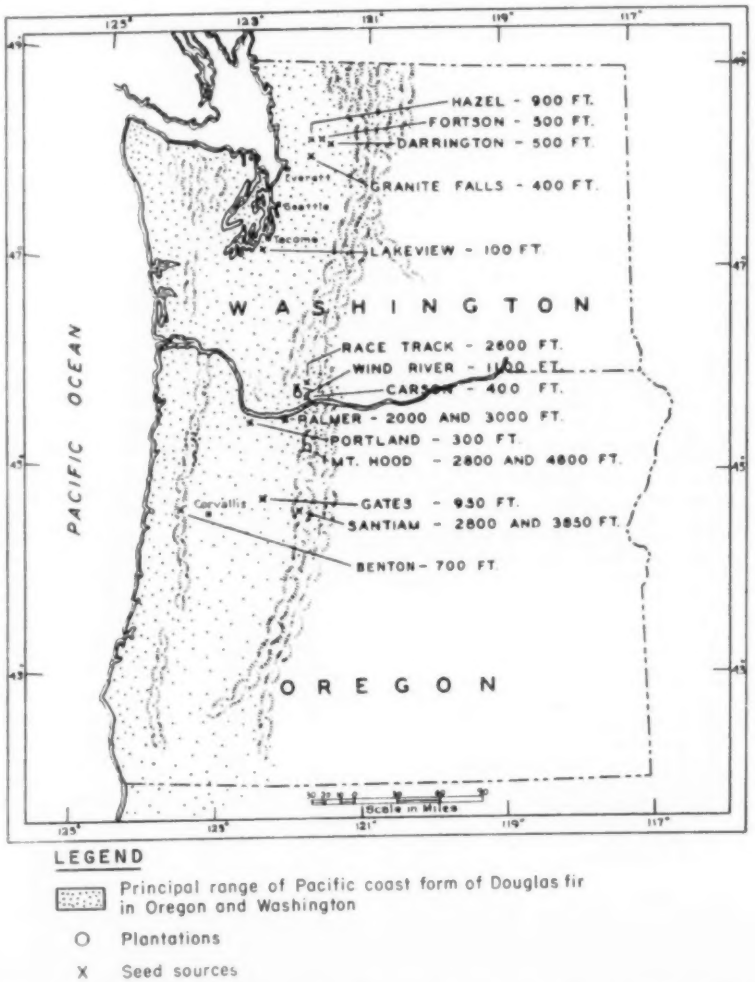

FIG. 1.—Locations and elevations of seed sources and test plantations on which Douglas-fir bud bursting was observed.

[1]Morris and Silen are research foresters, Pacific Northwest Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric., Portland, Ore. Irgens-Moller is a graduate student, Oregon State College, Corvallis, Ore.

ent localities west of the Cascade Range, from Darrington in northern Washington to Benton near Corvallis, Oregon, 250 miles south. Seed source elevations ranged from 100 to 3,850 feet. Plantation layout was identical in that progenies from each parent tree were planted in the same relative position at the three locations. This was done to eliminate personal bias in the selection of planting site.

These plantations, with an elevational range of 3,500 feet, have furnished unusual material for comparison. From observations in 1933 and 1934, Munger and Morris[2] found that: (1) Bud bursting on the two Mt. Hood plantations average 2 to 4 weeks later than at Wind River. (2) In some years, buds burst as much as a month earlier than in others. (3) Ranking of the 13 seed sources according to date of bursting was nearly the same for the early- as for the late-bursting years. (4) Trees with earliest bursting buds came from localities having warm spring days and nights, such as occur in wide valleys. Those with intermediate bursting buds came from higher elevations, with cold spring days and nights. Trees with latest bursting buds came from localities in narrow valleys where cold air drainage resulted in warm spring days and cold sprnig nights. (5) Time of bud bursting (early or late) had no apparent relation to annual height growth.

[2]Munger, Thornton T., and William G. Morris. Growth of Douglas-fir trees of known seed source. U. S. Dept. Agric. Tech. Bul. 537, 40 pp., illus. 1936.

Seed Source Ranking

Progenies from the 13 seed sources have been rated at various times since 1933 for stage of bud bursting. These ratings are believed valid for purposes of comparison even though they have differed somewhat in technique and intensity of sampling, and though it has not always been possible to make observations at the same stage of growth.

In 1933, 1934, and 1936, 10 to 15 offspring from each of 4 to 21 parents were classified in one of the following groups: (1) All buds tight. (2) Buds bursting on most but not all branches; new needles on greater part of tree not spread out in normal brush-like arrangement. (3) New needles spread out on entire tree; new shoots noticeably elongated. In order to rank the seed sources as to earliness of bud bursting, the percent of progenies falling within each classification were assigned weights of 1, 2, and 3, respectively. The three weighted percentages were then added for each group of seed-source progenies, and the sources listed by ranking.

In 1955, these classifications were again used at Wind River for samples of three to six trees from each seed source. Due to the lateness of sampling on the lower Mt. Hood plantation, however, terminal shoot elongation in inches was estimated for ten branches in the upper crown. Ten trees from each seed source were used as a sample. On the upper Mt. Hood plantation relative bud development was determined through the same scheme of sampling as on the lower plantation. Buds were classified as (1) tight, (2) slightly swelling, (3) swelling but not burst, or (4) burst. The same system of weighting was applied to data from the 1955 observations as those in the 1930's, except on the lower Mt. Hood plantation, where "inches of average shoot elongation" were compared to obtain ranking.

Bud Bursting Consistency

Despite the influence of normal sampling error and differences in rating methodology, the rankings are remarkably consistent (Table 1). The early-bursting group—Carson, Portland, and Lakeview—rank in the upper part of all the lists. The late-bursting group—Hazel, Forston, and Benton—are always found near the bottom.

Records by Morris for several trees in the Portland area further support the view that earliness of bud bursting of individual trees

TABLE 1.—THIRTEEN SEED SOURCES OF DOUGLAS-FIR RANKED ACCORDING TO STAGE OF BUD BURSTING OF PROGENIES ON GIVEN DATES IN THREE PLANTATIONS

	1933			1934	1936	1955		
	(June 9)	(June 30)	(June 29)	(May 3)	(May 21)	(June 23)	(July 7)	(July 7)
Rank[1]	Wind River (1,100 feet)	Lower[2] Mt. Hood (2,800 feet)	Upper[3] Mt. Hood (4,600 feet)	Wind River (1,100 feet)	Wind River (1,100 feet)	Wind River (1,100 feet)	Lower[4] Mt. Hood (2,800 feet)	Upper Mt. Hood (4,600 feet)
1	Portland		(Portland	Carson	Portland	Carson	Carson	Lakeview
2	Carson		and Carson	Portland	Carson	Portland	Portland	Portland
3	Lakeview		burst	Lakeview	Lakeview	Granite Falls	Race Track	Carson
4	Gates		earliest.)	Gates	Gates	Lakeview	Wind River	Palmer
5	Santiam			Santiam	Santiam	Race Track	Gates	Santiam
6	Race Track			Race Track	Race Track	Gates	Santiam	Darrington
7	Palmer			Palmer	Palmer	Palmer	Lakeview	Race Track
8	Wind River	(Granite Falls,		Wind River	Wind River	Darrington	Palmer	Gates
9	Granite Falls	Darrington,		Granite Falls	Granite Falls	Santiam	Darrington	Wind River
10	Benton	Benton, Fortson		Darrington	Benton	Wind River	Hazel	Granite Falls
11	Darrington	and Hazel burst		Benton	Darrington	Benton	Granite Falls	Hazel
12	Fortson	latest.)		Fortson	Fortson	Hazel	Benton	Benton
13	Hazel			Hazel	Hazel	Fortson	Fortson	Fortson

[1]1 is most advanced; 13, least.
[2]Examined when bursting was too far advanced to permit ranking other than by two broad groups.
[3]Examined when bursting was not sufficiently advanced to permit ranking other than by two broad groups.
[4]Examined when bursting was too far advanced to accurately recognize differences between the earlier bursting seed sources.

remains consistent through the years. For 14 years, two trees less than 200 feet apart have, on the average, burst their buds 7.8 days apart. This is statistically significant at the 1 percent level, with standard error of ± 1.07. Tree 1 invariably burst its buds before Tree 2 (Table 2). The narrow range in interval between bud bursting dates, regardless of extremes in climatic variation during this time, is remarkable. Phenological records from nine other trees, observed over periods of from 3 to 15 years, show the same consistency.

TABLE 2.—SELECTED BUD-BURSTING DATES OF TWO DOUGLAS-FIR TREES OBSERVED NEAR PORTLAND, OREGON,[1] DURING THE PERIOD 1942-55

Item	Year	Bud-bursting date Tree 1	Bud-bursting date Tree 2	Interval (days)
Greatest interval	1952	April 29	May 11	12
Least interval	1943	May 4	May 6	2
Earliest season	1947	April 14	April 24	10
Latest season	1955	May 18	May 27	9

[1]950 feet elevation.

All the above-cited observations suggest a strong genetic control over time of bud bursting in Douglas-fir. Proof must of course come from more detailed studies. However, the observations do strengthen the longheld view that Douglas-fir planting stock should be matched closely in growth period to the area to be planted.

Regeneration in the Sandhills[1]

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THE RISING DEMAND for wood is turning the attention of foresters to the sandhills of the Southeast. The pine-growing potential of these lands has heretofore largely been ignored, but now timber growers have begun to acquire them actively and to seek information as to their management.

In 1952, the Southern Forest Experiment Station, in cooperation with the Florida Board of Forestry, established the Chipola Experimental Forest in a typical sandhill area near Marianna, in northwest Florida. This article summarizes sandhills problems and early research results.

The Region

Of relatively recent geologic origin, the sandhills are high, dry ridges of the lower Coastal Plain. They extend in a patchy band from the western part of continental Florida up the coast into the Carolinas. Their total area is about ten million acres. The sands are very deep; on the Chipola Experimental Forest drills have gone down a hundred feet without encountering clay.

The climate of the region is mild and humid. Rainfall averages 55 to 60 inches, fairly well distributed throughout the year. Percolation is so rapid, however, and evapotranspiration so high, that soil-moisture deficiency is the normal condition during the growing season.

The original vegetation was an association of longleaf pine (*Pinus palustris* Mill.), scrub oaks (*Quercus laevis* Walt. and *Q. incana* Bartr.), and pineland three-awn (*Aristida stricta* Michx.), the common wiregrass of the Southeast. The pines grew in patchy, open stands of about two to four thousand feet per acre (Fig. 1). When they were logged off, the scrub species took over the site. Today, the vegetation consists of oaks, wiregrass, and a few pines that the loggers passed up. The pines are of poor quality and poorly distributed.

The most pressing forest management problem in the sandhills is pine establishment. Over twenty years ago, on the old Choctawhatchee National Forest—now Eglin Air Force Base—Gemmer and Heyward[2] noted that even though cutting practices had been improved and the frequency and extent of fires decreased, the generally adverse conditions on these sites were preventing natural replacement of pine.

Drastic steps are necessary. We cannot hope for success by simply aiding the natural processes, for the sparseness and low quality of the seed trees would make regeneration unbearably slow.

The Soil-Moisture Problem

Pine plantings in the undisturbed

[1]Revision of a paper presented at the meeting of the Association of Southern Agricultural Workers, Atlanta, Georgia, in February 1956.

[2]Gemmer, E. W., and F. W. Heyward. A study of the root systems of longleaf pine and of associated vegetation on the Choctawhatchee National Forest. Unpublished report, Southern Forest Experiment Station, New Orleans, La. 1931.

FIG. 1.—The original sandhills vegetation was an association of longleaf pine, scrub oaks, and wiregrass.

FIG. 2.—Growth in the sandhills: a 13-year-old plantation established on a prepared site.

brush show very poor growth. In 1943 a local landowner planted slash pine (*Pinus elliottii* Engelm.) in a typical scrub oak and wiregrass area. Today, 13 years later, some of the survivors are less than two feet high and the largest have not yet reached fencepost size. Such growth is unacceptable in the South but, fortunately, this is not the whole story. At the same time this plantation was being established, Mr. W. L. Hightower, in Washington County, Florida, was planting slash pine on a sandhills old field. Today, his 13-year-old stand contains 19 cords per acre (Fig. 2). Good growth on sandhill old fields is not unique. Here and there longleaf pine has been able to regenerate naturally in these fields, and fine timber stands less than 40 years old can be found.

Success seems to depend on the absence of competing vegetation. A field remains clear of oaks and wiregrass for years after it is abandoned. On undisturbed areas, however, the oak and grass roots form a dense mat near the surface, and pines simply cannot compete successfully for the soil moisture necessary to their survival.

In one of the first studies on the Chipola Experimental Forest, pines were planted on an area where only the oaks had been deadened. The pines still had to compete with a dense cover of pineland threeawn, and release from oaks alone made no significant difference. About the same time, re-examination of an almost forgotten site-preparation trial on the old Choctawhatchee National Forest showed that removing all competing plants by disking the site prior to planting improved survival and growth.[3]

Recognition of scrub oak and wiregrass as vigorous competitors for soil moisture emphasized the need for other studies of site preparation. Seedlings were planted on areas where the original vegetation had been pushed off with bulldozers, and on others where it had been chopped down with a heavy, oversize version of a cornstalk chopper (Fig. 3). Less complete methods of reducing competition included burning, basal-spraying the oaks, and planting in furrows.

Complete removal of all vegetation gave the best survival. Over a two-year period, survival of slash pine has averaged 85 percent on sites prepared by bulldozing. Furrowing gave survival of 71 percent. Burning the grass and spraying the oaks did not give appreciably better survival than no treatment at all (survival on untreated plots was 47 percent), mainly because the grass quickly recovered from the fire.

Fundamental studies where soil moisture is measured with electrical-resistance units are confirming the hypothesis that much more moisture is available to the pines on the drastically prepared sites than on the others. And pilot plantings on thoroughly cleared sites have given survival percents in the nineties for slash, loblolly, and shortleaf pines at the end of the second growing season:

[3] Fassnacht, Donald L. An old bet pays off. Southern Lumber Jour. 58(1):24, 78, illus. 1954.

FIG. 3.—At present, mechanical site-preparation methods are the most efficient.

Species	Survival	Average height
	Percent	*Feet*
Slash	93	1.8
Loblolly	92	1.7
Shortleaf	89	1.4
Longleaf	41	0.0

In the middle of the third growing season many of the individual slash pines were over five feet tall. In these same plantings, as in many others elsewhere in the South, longleaf survived only half as well as slash pine. However, the survivors are vigorous, and 20 percent started height growth in their second year.

Indications and Plans

While the bulk of the Chipola studies have been devoted to soil-moisture relationships, other aspects of regeneration have not been neglected.

The accepted planting practices used elsewhere in the South have been found to be satisfactory in the sandhills. Clipping of longleaf foliage, when not too severe, has helped survival by reducing transpiration, but dipping in a commercial wax preparation has given no conclusive results.

Choice-of-species tests are also under way. Longleaf and sand pine (*Pinus clausa* [Chapm.] Vasey) are native to the sandhills. The performance of slash pine on sandhill old fields is very good. Loblolly and shortleaf show good initial survival but poorer growth and greater insect susceptibility than slash. Longleaf, sand, and slash pine, therefore, are the species emphasized in Chipola Forest plantings, but other southern and western pines are being tested, together with hybrids and exotics. A superspecies would be welcome, of course, but it is not a necessity. The performance of slash, longleaf, and sand pines is very promising.

The biggest immediate job is to find inexpensive ways to eradicate scrub oak and wiregrass competition so that pines can be grown. Tests using chemicals, fire, and heavy machinery alone and in combination are under way. Chemicals will do the job, but so far the amounts required make the cost excessive. Fire will probably be most useful as a supplement to one of the other methods, since it does not kill the roots or underground stems. Heavy machines, particularly tandem brush-chopers and rootrakes, do an effective job. Costs are not excessive, but even less expensive methods are needed.

Clearly, the sandhills can be made to grow pine and grow it rapidly. As techniques of reforestation are still further improved, more and more of these lands will be contributing to America's wood supply. In anticipation of that time, the Chipola Experimental Forest has also begun research on the very interesting problems of managing sandhill stands.

Wet Weather Tip

Wet weather in the woods makes "book keeping" quite a chore. Keeping paper dry in the rain is impossible. Celluloid and other plastic materials require a lot of work to make up individual forms. Recently when confronted with this problem a test was made with Keuffel and Esser Co. Stabilene Film, Helios dry developing black line *Scribe Coat* (thickness .0075 inches). This is a sensitized material used for topographic map reproduction.

Several of the necessary forms are either typed or drafted on a sheet of tracing cloth or paper. The tracing and the Scribe Coat is then run through an Ozalid machine to print the forms. The emulsion side of Scribe Coat has a surface ideal for pencil. The forms can be easily cleaned by a hard rubbing with a wet rag.

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The American Society of Range Management [1]

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AMONG the youngest of the professional biological societies, the American Society of Range Management was organized in January 1947 to encourage and promote sound management of grazing lands. Appropriately, it is dedicated to fostering advancement in the science and art of grazing land management, to promoting progress in the conservation and greatest sustained use of forage and soil resources, to stimulating discussion and understanding of scientific and practical range and pasture problems, to providing a medium for the exchange of ideas and facts among members and with allied technologists, and to encouraging professional improvement of its members.

Membership in the Society is open to all who are interested in or engaged in range or pasture management or animal husbandry; administering grazing lands; or teaching, conducting research, or engaged in extension activities in range or pasture management or related fields. Formed by a group of ranchers, range researchers, college and university professors, and professional land managers to fulfill their need for a common meeting ground, its membership reflects these interests. Included are professional federal and state employees in all phases of grassland technology, in wildlife management, and in animal husbandry; ranchers; professional ranch managers and workers; educators; students; and businessmen in related fields. Membership ranges from 2,900 to 3,000 annually. While a majority of Society members reside west of the Mississippi River in the United States, about 200 live in the eastern United States, and others in 55 foreign countries. The larger foreign memberships are in Canada, Mexico, and South American countries.

The Society is governed by a board of directors consisting of 6 directors, the past president, the president, vice-president, and an executive secretary hired by the board for an indefinite period. The president, vice-president, and 2 directors are elected annually by letter ballot from the entire membership. Nominations are by a committee appointed annually by the board of directors or by petition from the membership. Term of office is 3 years for directors, and 1 year for the other elected officers. Officers may not succeed themselves. Annual dues of the Society are $6.00 for regular members and $4.00 for student members. One dollar additional postage is required for members outside the North American Continent and insular possessions of the United States.

Eighteen sections or chapters of the Society have been organized by members to provide attention and discussion on local grassland problems. Of these 17 are located throughout the United States, and 1 in the Middle East with headquarters at Cairo, Egypt. Sections are organized on state or regional lines to encompass areas of common interest and problems. Generally, 2 or more meetings are held annually by the sections, with emphasis on on-the-ground discussion and tours.

One national meeting is held each year by the Society. Usually it lasts for 3 days and is attended by 400-500 members and their guests. All business and programs are conducted in general sessions designed to meet a wide range of interest. The place of meeting is selected 2 years in advance by the board of directors. An additional semi-annual business meeting is held by the governing board each year in July or August. This is generally convened in Salt Lake City, Utah or Denver, Colorado. In addition, special committees of the Society appointed by the board of directors inquire into and make recommendations on study courses for grassland students in high schools and universities, range and pasture research needs and techniques, Civil Service requirements and regulations, and other matters of interest and concern to rangeland workers and users.

The Society publishes the JOURNAL OF RANGE MANAGEMENT which reports results of research, both current and projected, and practical experience of ranchers and practicing range managers. A majority of the published information on rangeland management now appears in the JOURNAL. Publication is bi-monthly, and subscription to the JOURNAL is included in the annual dues. The JOURNAL is published under the direction of an editor selected by the board of directors for a 3-year term. The editor is assisted by an editorial board appointed for 2-year terms so that 2 new members are appointed each year.

All business and correspondence concerning membership, renewals, purchase of back issues of the JOURNAL, etc., should be addressed to the Executive Secretary, Box 7745, Albina Station, Portland 12, Oregon.

[1] This is the fifth in a series of articles dealing with the organization and objectives of technical societies that should be well known to readers of The JOURNAL OF FORESTRY.

[2] The author is indebted to Mr. W. T. White, executive secretary of the American Society of Range Management, for information provided.

Notes

Loblolly Pine Not Suited for Bud Pruning

To grow knot-free logs yielding clear lumber, certain pines can be pruned at an early age by removing all the lateral buds from the terminal cluster. In southern pines, where several spurts of height growth occur per season and branching is not confined to a single whorl, the lateral branchlets of the second and later whorls also need to be removed each year. In bud pruning, it is customary to retain branches on the basal 2½ feet of stem.

To find out whether loblolly pine is suited for bud pruning, a small test was installed on the Hitchiti Experimental Forest, near Macon, Georgia. Four treatments were tested on each of three blocks in an old-field stand 5 years old: (1) pruned and thinned, (2) pruned only, (3) thinned only, and (4) neither thinned nor pruned. The unthinned stand had an average spacing of 6 by 6 feet, and the thinned stand was cut back to an average spacing of 12 by 12 feet. The relative growth in diameter and height after four successive years of treatment is shown in Table 1.

TABLE 1.—GROWTH AFTER FOUR SUCCESSIVE YEARS OF TREATMENT

Treatment	Trees	Relative diameter growth	Relative height growth
	Number	*Percent*	*Percent*
Pruned and thinned	75	51	53
Pruned only	75	34	69
Thinned only	75	132	95
Control	75	100	100

The reduction in height growth on the thinned as compared with corresponding unthinned plots may in part be due to shock from thinning as reported by Staebler.[1]

The reduction in growth alone makes bud pruning of doubtful value. There are other disadvantages, summarized in Table 2, which definitely indicate that loblolly

[1]Staebler, George R. Evidence of shock following thinning of young Douglas-fir. Jour. Forestry 54: 339. 1956

FIG. 1.—One season's growth of epicormic branches on pruned portion of main stem of loblolly pine.

FIG. 2.—Basal branches left on this bud-pruned tree, even though cut back once, are again as large as the main stem.

TABLE 2.—SOME UNFAVORABLE RESULTS OF BUD PRUNING LOBLOLLY PINE OTHER THAN GROWTH REDUCTION

Treatment	Occurrence of epicormic branches			Ratio of height of basal limbs to height of main stem	Trees with crook or severe sweep[1]
	Trees	Per tree	Avr. length		
	Percent	*Avr. number*	*Feet*	*Percent*	*Percent*
Pruned and thinned	95	10.1	1.25	[2]58	93
Pruned only	93	8.3	.75	34	49
Control	0	0	----	----	22

[1]Caused by tip moth attack.
[2]The basal limbs on the thinned plots were cut back once before to keep them from overtopping the leader.

FIG 3.—An occasional well-formed tree is obtained by modified bud pruning in unthinned stands.

pine is not suited for bud pruning.

During each growing season, numerous epicormic branches form along the previously pruned portions of the stem, as shown in Figure 1. These branches are most numerous on the widely spaced trees in the pruned and thinned plots, but they also occur on pruned trees in unthinned plots. A second disadvantage is that the basal branches on some trees become as large as the main stem (Fig. 2). A third drawback develops from tip-moth damage to the terminal bud. Since all the lateral buds are removed by bud pruning, an epicormic sprout will take over as the leader, thus causing typical crook in the main stem shown in Figure 2. Tip moth damage may also be responsible for some of the reduced height growth associated with bud pruning and thinning. In unthinned stands, tip-moth damage is not severe, nor do the basal branches develop vigorously, and occasionally a well-formed tree with few or no epicormic branches is encountered (Fig. 3). However, the diameter of the pruned tree is greatly reduced when compared with an unpruned tree in a thinned stand.

Because of the vigor of epicormic sprouting and the growth loss and tendency to poor form in the pruned trees, bud pruning in loblolly pine apparently offers no advantages over conventional branch pruning.

E. V. BRENDER
Southeastern Forest Experiment Station, Forest Service, U. S. Department of Agriculture

An Improvd Device for Planting Tree Seedlings

Planting even small seedling trees is, at best, a physically exhausting procedure but it must be done, and done quickly, if the trees are to grow on the acreage reserved for them. Using the method and equipment best suited for the situation with which he is faced is the personal problem of the tree farmer. Knowledge of the possible methods, and the advantages, or drawbacks, of each one, greatly simplifies the choice of the method to be used. It is a pleasure to report on a comparatively new method of planting seedlings, and one that my nephew and I prefer to use.

The first few thousands of trees we planted on the steep hills of our tough New York pastureland, were put in with spades, mattocks, and half of an old posthole digger. Two years ago, however ,we located and started using the *Gorecki Double Tractor Tree Planting Bar*.[1] This bar, which is specially "tailored" to fit different sizes and makes of tractors, and of moderate cost, is a heavy bar with sharp extension blades that is bolted to the tractor wheel. On a four-foot wheel the ends of the bar dig holes in the ground four inches wide, from six to ten inches deep, and six feet apart. We found that we averaged 1,000 holes an hour, using this device, and that in 1955 we secured a 90 percent survival of the seedlings.

By utilizing the services of four "Future Farmer" boys from the local high school, with one of us to run the tractor and the other to bring the seedlings from their heeled in position at the brook to the high hills now reforested, we have usually planted 1,000 trees an hour with a crew of six. Purchased from the state nursery the seedlings cost $3.50 per thousand. The total cost of planting, using the Double Bar, has been about $10.00 per thousand. Now that the

[1]The Gorecki Double Tractor Tree Planting Bar—available from The Gorecki Company, 16 Franklin Street, Franklinville, New York. Price on request. Patent applied for.

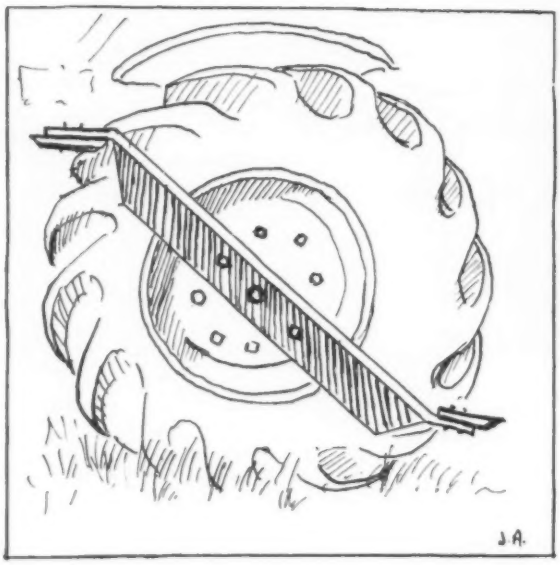

FIG. 1.—*Left*, sketch showing bar mounted on tractor wheel; *above*, Gorecki Double Tractor Tree Planting Bar in operation.

back-breaking problem of digging the holes is satisfactorily solved for us we have ordered 30,000 seedlings for delivery next spring. This will complete our planting on our main tree farm, and should soon result in making a heavily wooded hillside of a rough, stony old dairy pasture, at a minimum expenditure of money and effort.

KENNETH ANDERSON
Washington, D. C.

The Bitterlich Method of Cruising—Why Does It Work?

One of the questions raised in connection with the Bitterlich method of cruising concerns what Grosenbaugh[1] calls "operating principles." In trying to explain the theory of the method to his students, the writer has found that an explanation based on the variability of plot sizes for trees of different diameters (variable plot radius method) is simpler, and understood much easier than one involving the use of a grid, as described by Grosenbaugh in his original article.

The specific question asked by those just getting acquainted with the Bitterlich method is why the average number of "counted" trees per point, multiplied by the basal area factor should equal the basal area per acre?

The following discussion, attempting to answer this question, uses as an illustration an instrument with critical angle of 104.18 minutes and requiring the use of 10 as the basal area factor. However, the explanation would apply to any instrument, irrespective of its critical angle.

In an instrument with critical angle of 104.18 minutes the ratio of the length of the cross arm to the length of the instrument is 1 to 33.

This means that in order for a tree to be counted, i.e. to appear larger than the cross-arm, it must be located at a distance of less than 33 times its diameter or, to put it differently, the tree must be located within a plot whose radius is 33 times as long as the diameter of the tree.

Thus, trees with d.b.h. of 6 inches must be located on a plot with a radius of 16.5 feet ($33 \times 6 = 198$ inches, or 16.5 feet); trees with d.b.h. of 8 inches must be located on a plot whose radius is 22 feet. As the diameter of the tree increases so does the plot on which the tree must stand in order to be "counted."

The relationship between d.b.h. of a tree, and the radius and the size of the plot on which the tree must be located to be counted is shown in Table I. (Columns 1, 2, and 3).

Any type of partial cruising (sampling) is based on the assumption that the count of trees on a part or parts of the area in question can be projected or converted by simple proportion into the total number of trees of the same sizes found on the entire area, or on one acre. If, for example, an average of 100 trees are counted on one acre, there would be 4,000 such trees on a forty, or 64,000 trees on a section.

[1] L. R. Grosenbaugh. Plotless timber estimates—new, fast, easy. Jour. Forestry 50:32-37. 1952.

This relationship applies of course to the Bitterlich method of cruising. Every tree actually "counted" in the field represents a certain number of such trees per acre.

How many trees per acre are represented by each "counted" tree depends on the size of the plot on which the count is made. For example, trees of 6 inches d.b.h. are counted if located within a plot with 16.5 foot radius. Such plot is .019625 acres in size. It takes 50.96 plots of this size to make one acre ($1.0 \div .019625 = 50.96$). Therefore each "counted" tree of 6 inches d.b.h. represents 50.96 trees of this size per acre. Or to take another extreme, trees of 40 inches d.b.h. are counted if they stand on a plot with a radius of 110 feet, i.e. on a plot .87222 acres in size (see Table I). It takes 1.15 plots of this size to make on acre ($1.0 \div .87222 = 1.146499$), and therefore each counted 40-inch tree represents 1.15 such trees per acre.

The number of trees of various sizes per acre represented by one "counted" tree of the corresponding d.b.h. is shown in Table I, column 4. It is this number combined with the basal area of a tree of the same d.b.h. that is the key to why the Bitterlich method works. It works because each counted tree, irrespective of its size, represents a certain number of trees per acre, whose combined basal area is equal to 10 square feet (Critical angle of 104.18 minutes). This can easily be proven by multiplying the number of trees per acre represented by each recorded tree (column 4) by the corresponding basal area of one tree. In every case the product of multiplication is 10.

This figure is referred to as the "basal area factor"; actually it shows the basal area per acre represented by each tree recorded in the Bitterlich method of cruising.

TABLE 1.—SIZE OF PLOTS, CONVERSION FACTOR AND BASAL AREA PER ACRE FOR TREES OF VARIOUS DIAMETER CLASSES

D.b.h.	Plot radius in feet	Plot size	Per acre conversion factor[1]	Basal area of one tree	Basal area per acre
Inches	*D.b.h.×33*	*Acres*		*Sq. ft.*	*Sq. ft.*
6	16.5	.019625	50.96	.196	10.0
8	22.0	.034889	28.66	.349	10.0
10	27.5	.054514	18.34	.545	10.0
12	33.0	.078500	12.74	.785	10.0
14	38.5	.106876	9.36	1.069	10.0
16	44.0	.139555	7.17	1.396	10.0
18	49.5	.176625	5.66	1.767	10.0
20	55.0	218055	4.59	2.181	10.0
22	60.5	.263847	3.79	2.640	10.0
24	66.0	.314000	3.18	3.142	10.0
26	71.5	.368514	2.71	3.69	10.0
28	77.0	.427388	2.34	4.28	10.0
30	82.5	.490625	2.04	4.91	10.0
32	88.0	.558222	1.79	5.59	10.0
34	93.5	.630180	1.59	6.30	10.0
36	99.0	.706500	1.42	7.07	10.0
38	104.5	.787180	1.27	7.88	10.0
40	110.0	.872222	1.15	8.73	10.0
42	115.5	.961625	1.04	9.62	10.0
44	121.0	1.05538	.95	10.56	10.0

[1]Number of trees per acre for every tree tallied on the cruising plot.

For those who like to think in terms of mathematics, the following proof is offered:

The basal area of a tree $= \frac{\pi D^2}{4} = .785D^2$ square inches, or $.00545D^2$ square feet ..... (1)

The size of the plot on which trees with the diameter D are counted $= \pi R^2$

R is 33 times as large as D, hence

Plot area (sq. inches) $= \pi \times (33 \times D)^2$

Plot area (sq. feet) $= \frac{\pi \times (33 \times D)^2}{144} = 23.7402D^2$

Plot area (acres) $= \frac{23.7402D^2}{43560} = .000545D^2$ ..... (2)

From the above it can be seen that the ratio of the basal area (sq. feet) of one tree to the size of the plot (acres) is 10 to 1. In both cases the equations are based on the same diameter (D); therefore this relationship will hold for trees of any d.b.h.

If the plot is increased to one acre, the basal area per acre of trees represented by one counted tree would be increased proportionately:

$$\frac{\text{1 acre}}{\text{plot area}} = \frac{\text{b.a. per acre}}{\text{b.a. of one tree}} \quad \text{or}$$

$$\frac{1}{.000545D^2} = \frac{\text{b.a. per acre}}{.00545D^2} \quad \text{and}$$

$$\text{b.a. per acre} = \frac{1 \times .00545D^2}{.000545D^2} =$$

10 sq. ft.

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Points of View

Comments on Relationship of Forestry and Land Surveying

The report of the Committee on Registration and Licensing of Foresters appearing in the January issue of the Journal is an enlightening coverage of this timely matter. Mr. Julius Kahn and his committee is to be commended on its comprehensive work.

The report touches upon the relationship of foresters and land surveying, a subject which undoubtedly will produce many differing opinions. I would like to comment and enlarge upon the phase of forest land surveying. The Committee suggests amending existing land surveyors licensing acts, or providing for qualifications for forest land surveyors in forestry work. The statements were general, so perhaps it is possible that some of us readers will interpret a different meaning than was intended.

Forest land surveying deserves considerably more attention in view of the rapidly increasing land, timber, and mineral values, and because of the mixed ownerships in many areas. Surveying is an old profession based on well-founded principles of long-standing; it is not dependent upon forestry for its execution. The term "forestry" may cover a wide range of activities, and as the report mentioned, often includes land surveying. We must be careful not to attempt to separate "forest land surveying" from "land surveying." In my opinion, where forest administration requires a careful survey job, such job should be executed with the requisite accuracy by qualified personnel. Let us not call it "forest land surveying" and accept a mediocre performance.

Land surveying in forest areas often requires a fine sense of old-fashioned woodmanship in order to achieve the high degree of performance to which it is entitled. Here I am referring to the tracing of original surveys, and the proper identification of true survey evidence, or, just as important, the rejection of false or uncertain evidence. The value of this ability should not be underestimated; it is not attained by one season in the woods, nor by the ordinary college course in surveying. In many areas here in the Pacific Northwest the solving of discrepancies in old government surveys is more dependent upon inquisitive woods-sleuthing than upon precision instrument solution.

The writer has observed a number of mistakes in surveys and boundary identification caused by licensed engineers as well as newly graduated foresters. None of these errors warrants excuse. However, it is easier to understand that a new man in the woods is likely to make mistakes because of inexperience, or because of unfamiliarity with a locality new to him. In one case it was necessary to check a survey job done by a licensed surveyor, who, incidentally, was not a professional forester. The government survey was carefully traced, some supposedly lost corners were recovered, and a timber trespass of several thousand dollars in value defined. When presented with the facts, the surveyor could not deny his error. The value of the trespass was recovered. These instances point out two important considerations. First, adequate field training and experience is necessary to equip a forester for the public responsibility of land surveying. Secondly, it is evident that a few surveyors and engineers have "taken to the woods" to hide their careless methods. The corrective answer lies with experienced professional foresters who realize that efficient forest administration calls for reliable land surveying. We can run the careless engineers out of the woods only by improving our own standards of performance.

The question of unlicensed foresters now doing land survey work may not be easy to reconcile, but it is doubtful if the situation would be improved by presenting a provisional forest land surveyor certificate in conjunction with a registered forester license. In the Northwest many companies and agencies already employ registered surveyors and engineers to accomplish such work. In addition, many individual foresters who have found it necessary to do surveying in the course of their company duties have, of their own volition, prepared for and taken the state examination and acquired their licenses. These foresters maintain a measure of pride in their accomplishments, and are not prone to carelessly use this responsibility and risk loss of same. The adaptable forester will meet his surveying problem according to his own rules; he can become one of the best of the land surveyors.

Forestry as a profession is manifold, it is true, but to establish it with integrity among the professions we must refrain from infringing upon the bounds of the other professions.

JACK W. COSKEY
District forester,
Milwaukee Land Co.,
Centralia, Wash.

I have just been reading the report of the Committee on the Registration and Licensing of Foresters in the January JOURNAL. Of particular interest to me was the subtopic *Foresters Performing Surveying Services* on page 49.

Since I have been having bitter experience in dealing with this subject, I'd like to express briefly my thoughts concerning paragraphs 6 and 7.

1. I agree that all existing land surveyors acts be amended to provide exemption for graduate professional foresters in the performance of their forestry activities.

2. I don't agree that a better solution would be an additional

section concerning qualifications for forest land surveyors, *unless it was administered by professional foresters.* My personal feeling is that the engineer-dominated boards (at least here in Maryland) don't have any sympathy for professional forestry work. As an example, your letter to me covering the interrelationship of forestry and land surveying has not to my knowledge made any impression on the Surveying Board in this state. Even your kind offer in that letter to appear before the Board about this subject was never accepted.

3. I'm all for direct negotiation with the organized engineering profession to see just where we stand with them.

4. All of paragraph 7 has been repeated time and again by me in my efforts here without avail. You might add to this list delay in carrying out professional activities while waiting for a registered land surveyor in questionable boundary cases.

The committee's report was to me very thorough and interesting. I for one, am glad to see this evidence of interest in a problem that has plagued me greatly, especially as a consulting forester.

One thought I would like to interject regarding review boards of all kinds is the term of tenure. I feel successive reappointments to these boards results in very arbitrary action, almost a dictatorial feeling of supreme authority.

JOHN F. DAVIS
Consulting forester,
Snow Hill, Md.

Suggestions for Revision of Terminology Dealing with Fire

The authors wish to suggest a change in the terminology of burning, substituting the term "control-burn" for "controlled burn." We also wish to point out the need for more rational definitions and employment of terms describing the use of fire for land clearing.

The term "controlled burning" is offensive because of its lack of euphony and its inaccurate implication. Reading the clause "The area was controlled burned in 1954" is undeniably awkward, whereas "The area was control-burned in 1954" is smooth. Moreover, "control-burned" is the common usage in speaking, hence it could and should be carried over into writing.

Implication of the term "controlled burn" is that the fire was at all times under control. But this is not true, at least in California, as witnessed by the number of escapes that become wildfires each year in this state. We feel that the term "control-burn" would imply burning with effort to control, which is the true situation, but without the degree of control certainty implied by "controlled burn."

With respect to more careful use of terminology, we recognize several degrees of intensity within what might be called the spectrum of burns used in land management. They are not clearly distinguished, however, in the accepted glossaries. For instance, the Society of American Foresters' glossary, *Forestry Terminology*, defines controlled burning as:

> The deliberate use of fire on an area whereby burning is restricted to a predetermined area and intensity.

The Soil Conservation Society of America's Soil and Water Conservation Glossary defines controlled burning as:

> Any deliberate use of fire on land where the burning is restricted to a predetermined area and intensity. The intensity of fire is controlled by the time of year, the time of day, and the moisture content of vegetation in the area. Syn. *Prescribed Burning.*

Writing in *California Agriculture*, 1951, on "Use of Fire in Land Clearing," Arnold, Burcham, Fenner, and Grah defined controlled burning as . . . "*the planned application and confinement of fire to a preselected land area.*" They also recognized the . . . *convenience fire where the only elements planned are time and place of burn.*"

The basic terminology of Arnold *et al.* was accepted by Sampson and Burcham in their California State Division of Forestry Bulletin, 1955, on "Cost and Returns of Controlled Brush Burning for Range Improvement in Northern California in which the authors defined controlled burning as:

> The planned application and confinement of fire to a preselected land area; usually, these are wild lands. The actual burning may be done in many different ways: in some instances so-called "convenience fires" are set in which the only elements predetermined are time and place of burn.

All of these terms have merit, but the slight changes in them as used from year to year by different persons point clearly to a need for redefinition in terms that are subject to general agreement. We propose the following:

Management burning.—A general term covering the deliberate use of fire on land for the purpose of removing unwanted plant material. Management burning includes convenience burning, control-burning, and prescribed burning.

Convenience burning.—The simplest form of management burning, in which the only elements planned are time and place of firing.

Control-burning.—The application of fire to a preselected land area according to a definite plan, utilizing control forces judged adequate to confine the fire to the area selected.

Prescribed burning.—The ultimate in careful use of fire as a tool for land clearing involving:

Use of fire as a silvicultural tool;
burning under rigid restriction with respect to the humidity and temperature of air and fuel;
burning within rigidly specified ground limits;
burning with the fire under full control at all times; and
not burning when weather or other conditions are unfavorable at the time planned for firing.

Inasmuch as these conditions are not met in the "controlled burns" commonly conducted in California, they cannot be called "prescribed burns." In this respect the glossary definition of the Society of American Foresters is inadequate, whereas that in the Glossary of Soil and Water Conservation is inaccurate.

Copies of this letter were sent to the Society of American Foresters, the Soil Conservation Society of America, and the American Society of Range Management because the terminology in question is used in the subject fields of all three groups.

A. W. SAMPSON,
Professor emeritus
University of California and
CLARK H. GLEASON, *forester,*
California Forest and Range Expt. Sta.

Reviews

A World Geography of Forest Resources

Edited for the American Geographical Society by Stephen Haden-Guest, John K. Wright, and Eileen M. Teclaff. 736 pp. Illus. Ronald Press Company, New York. 1956. $12.50.

Here is a book born of a sound idea and addressed to a definite need, but marred by faulty organization and uneven execution. Yet despite the inequalities, it remains a unique and valuable contribution to forestry literature.

The book attempts a worldwide appraisal of our forest resources. The approach is essentially regional, 29 contributors reporting on 25 countries or regions. Covering more than 500 pages out of a total of 736, this regional section is by far the largest of the book. It is also the least satisfactory. One reason lies in the varying competence of the contributors. Most of them are seasoned experts, well qualified to deal with the regions they discuss. A few are less well endowed, and the disparity is very marked. But perhaps the uneven quality of the book must be charged chiefly to a lack of organization of the material itself. Better advance planning would have resulted in more uniform treatment of the regions and added greatly to the book's usefulness.

One suspects that, in the absence of any prearranged outline, the contributors emphasized the subjects that lay nearest their own interests, with the result that it is often difficult and sometimes impossible to compare similar phases of the forestry situation within the different countries. National forestry movements, policy, and research all suffer from spotty, unpredictable treatment. Shifting agriculture, probably the greatest enemy of forests throughout the tropical world, receives wholly inadequate regional coverage. The chapter on South America does not even mention it.

The regional section is preceded by five chapters of general content, each the work of a recognized expert in his field. They begin with a short but excellent article by Paul B. Sears, "The importance of Forests to Man." This is followed by a chapter on "The Forests of the Past and Present," by Wendell H. Camp, a chapter on "Forest Influences," by Samuel T. Dana, a fourth chapter on the "Principles and Practice of Forestry," by J. W. B. Sisam, and a fifth on "Forest Industries of the World," by George M. Hunt. These five chapters give good general coverage of the role forests play in human life and what man is doing both to degrade and enhance the resource.

An article by Erhard Rostlund on "The Outlook for the World's Forests and Their Chief Products" terminates the text. This, in effect, is a summing up of what lies ahead for world forestry. It is clearly written and well balanced, realistically facing a situation in which erosion, fire, and the increasing impact of world wood needs steadily diminish our forest resources. For Rostlund has not followed the dewy-eyed optimists, but looks with a scientifically skeptic eye at the rosy-hued picture of what miracles industry, new forms of silviculture, and the "inexhaustible" tropics can perform for a wood-hungry, overcrowding world. His concluding statement reflects the tone of his entire article: "The best I can say for the outlook is that there are bright patches on the horizon, but also dark clouds and much thick weather."

Rostlund's treatment of certain specific problems is less fortunate. He fails, for example, to understand the implications of shifting agriculture. When he says, "it is not destructive of soil if the rotation period is long enough," he is describing only the level and more stable areas where this practice has a useful place. He overlooks what it has done and is doing to the highly erosive soils of tropical America and of the Middle and Far East. Similarly, his statement, "it would be sounder to think of the areas given over to shifting agriculture as farm land, which they are, instead of calling them potential timberland," ignores the fact that current use of land does not determine its classification. No amount of shifting cultivation can convert forest soil into agricultural soil; in all too many cases it has converted millions of hectares into sterile, eroded wasteland.

To summarize: A major addition to forestry literature. But better initial planning, better integration and arrangement of the regional material, would have produced a clearer and far more useful picture of the world's forest resources and of the factors that, for good or bad, will determine their future service to mankind.

TOM GILL
Charles Lathrop Pack Forestry Foundation

Rabbits

By Laura I. Makepeace. 81 pp. Litho. Bibliographical Center for Research, Denver Public Library, Denver 2, Colo. 1956. $ 2.

The publication of a good bibliographic aid is always eagerly seized upon by workers in the field affected. Miss Makepeace's bibliography, consisting of 3,485 titles by 2,650 authors, published in 491 journals or other media, and arranged under 691 subject divisions, will quickly be recognized as a most valuable compilation of references on the group of mammals known as rabbits. It includes hares, jackrabbits, and foreign species, in addition to rabbits proper.

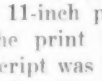
The bibliography is organized from the librarian's viewpoint. Foresters, agriculturists, wildlife

technicians, and others, used to more general subject divisions, may experience some difficulty in locating specific references among the 691 headings characterizing the present work. Of the first 85 headings (Column 1 of Table of Contents) every tenth heading is: *Rabbits, caracorum; Rabbits, Pennsylvania; Rabbits, fossil; Adrenal gland; Anaphylaxis; Anti-Sera; Aves; Bacteriology, veterinary.*

To locate in the bibliography all, or even most, of the material on any general subject, one must go through the contents with great care. Availability of the title or author's name will be found helpful in locating specific references. Numbering of titles and listing of corresponding numbers in the author index makes for quick location of entries once the author's name is known.

Produced by lithographic process, the 8½ by 11-inch pages are crowded and the print is small, since the manuscript was typed on larger paper and reduced. These mechanical shortcomings, like the excessive number of subject divisions, are but a small inconvenience in using this key to the literature of an important animal group.

LEE E. YEAGER
Colorado Cooperative Wildlife Research Unit



The Native Trees of Florida

By Erdman West and Lillian E. Arnold. 218 pp. Illus. University of Florida Press, Gainesville, Fla. 1956. $2.

This revision of a work which has been a standard manual for tree identification in Florida for a number of years is the product of a good many years of botanical exploration and collecting by its authors. Both are thoroughly acquainted with the flora of Florida.

This revised edition contains descriptions of six species which were not covered in the original work. In addition, twenty of the illustrations have been replaced by more suitable and authentic drawings. A number of corrections and additions as to text material have been made in keeping with recent observations as to extremes and variations in certain species. The scientific names used are in accordance with the latest Forest Service *Check List* so that the nomenclature is now in accordance with the most up-to-date usage.

A key using both leaf characters and fruit characters precedes the descriptions. The key is quite workable and its one disadvantage is the necessity of combining two sets of characters. However, a simple leaf key could hardly be compiled which would adequately separate all the species covered. This manual has proved valuable in teaching dendrology and should prove a valuable tool in the hands of the forester and botanist working in Florida.

REYNOLDS B. SMITH
University of Florida

Genetics in Silviculture

By C. Syrach Larsen. 224 pp. Illus. Oliver and Boyd Ltd., Tweeddale Court, Edinburgh 1, Scotland. 1956. 30s.

Foresters, forest managers, and forest owners will find this book by one of Europe's most prominent forest-tree breeders particularly interesting and informative. The author has consistently avoided the use of technical genetical terms. It is neither a textbook nor a manual; it is essentially a well documented discussion of the urgent need and of the methods available for the improvement of forest trees by selection and breeding. There are approximately 70 judiciously selected illustrations.

The opening chapter introduces the reader to the "Aim and Possibilities" of forest-tree breeding. This is followed by a brief but sufficient historical survey. Larsen's approach to the most immediate application of forest-tree improvement to practice is rightly directed toward the establishment of seed gardens of select clones. In the chapters on "Progeny Trials" (a discussion of provenance problems), "Controlled Pollination," and "Vegetative Propagation," the author provides the background and the basis for the chapter on seed-gardens, which he calls "our trump card in forest-tree breeding." He covers their importance and establishment, and includes estimates, based on his work in Denmark, on the quantity of seed per acre to be expected from seed gardens of larch, scotch pine, oak, and ash.

"Tree-shows" are given a prominent place in this book, as they have been in the author's publications for many years. Larsen's conception of a "tree-show" is apparently a combination clonal-test and demonstration planting. The combination of these objectives in a single plantation has been used effectively both in the United States and in Europe during the past thirty years of "selling" forest-tree breeding. But in the opinion of this reviewer, the recent world-wide "boom" and present soundly expanding interest in forest-tree improvement has in large measure relieved the forest-tree breeder of this originally necessary (and difficult) "selling" job. Tree breeding has now reached the stage where experimental designs available for statistically precise clonal tests should not be subjected to modification to enhance the possible demonstration value of a test planting. Such experiments will usually have demonstration value, but the emphasis of research should be on clonal tests, rather than on demonstration. It is for this reason that this reviewer has always preferred the designation "clonal test."

The chapters on "Breeding and Disease" and "Hybrids" include convincing examples from the author's breeding work during the past quarter-century. C. Syrach Larsen's extensive breeding with larch is well summarized in a separate chapter.

In the closing chapter "Breeding and Mechanization" the author contrasts progress in forestry with general technological progress. On page 200 he states: "Agriculture and horticulture have been able to

keep pace with the technical development and have contributed in advancing human society to its present state. It is extraordinary that forestry has remained standing at a level which is in many respects primitive. Although it is true that we can speak of a civilized forestry, in which great advances have been made by proper planting and tending, yet nevertheless, upon the whole, we utilize the trees much as they have been given to us. Although we also boast about increased production and quality, which have been achieved by the use of exotics and, still better, by the use of types which have been discovered by experience through provenance trials, yet nevertheless today one easily recognizes the original trees. It is only like a drop in the ocean and it applies equally well to the forestry of long-settled countries and to the uniform plantations of teak, eucalyptus, or conifers of recently settled lands and to the 'tree-farms' in the U.S.A. and Canada. On the whole we are cultivating only those same trees which were at the disposal of our remote forefathers."

American readers, accustomed to more crisp and direct writing, may find this book slow reading; sentences are often long and involved. This may be the result of a too literal translation. The rapid expansion of interest and research in forest genetics during the past five years, particularly in the United States, has to some extent already outmoded some aspects of this book. Nevertheless, this reviewer does not hesitate to recommend *Genetics in Silviculture* to American foresters.

ERNST J. SCHREINER
Northeastern Forest Experiment Station

Wood Particle Handbook

Edited by E. S. Johnson. 303 pp. Illus. School of Engineering, North Carolina State College, Raleigh. 1956. $3.

Foresters generally are not fully aware of the tremendous potentialities in this new product—the wood particle board, sometimes referred to as chip board, which promises to exert, as Dean Lampe of the North Carolina State College School of Engineering points out in a foreword, major influence on the furniture industry, the forest resources, and factory employment. The authors define wood particle board as "composition board of wood particles, coated with a resin binder and formed into shape by pressure." The Handbook presents technical information from our own and from 13 foreign countries. It describes the manufacture, marketing, and uses of particle board.

Unlike wood chips used in pulp, it is not necessary that the chips be cut across the grain as there is no penetration of the liquor; in other respects the chips are similar for particle board. Flakes and specially cut shavings result in boards that are often used for decorative effects. Generally, however, the particle board serves as a core. Most particle boards are manufactured in thin, flat, rectangular sheets.

The book describes at length the various manufacturing methods. According to the process chosen, plants cost from $660,000 to double that amount. Production costs average $75 to $95 per 1000 sq. ft. of ¾ inch flat board.

This book is timely, and does great credit to the Industrial Experimental Program of the College, a program established by the Legislature in 1955, to help develop small industry. Other states may profit by North Carolina's example.

A. B. RECKNAGEL
Ithaca, N. Y.

Silviculture

By J. Köstler. 416 pp. Illus. Oliver and Boyd, Ltd., Tweeddale Court, Edinburgh 1, Scotland. 1956. 45s.

This is the first central European silviculture textbook available in English, since Sir William Schlich included three volumes on silviculture in his *Manual on Forestry* half a century ago. Dr. Köstler is professor of silviculture at the University of Munich and published his book in 1949. The present volume was translated by Prof. Mark L. Anderson of the University of Edinburgh. Measures are therefore expressed in British terms, some of which, including hoppus units, are strange to American foresters.

The book is a comprehensive treatment of silviculture, presenting much classical information and many data not included hitherto in silvicultural textbooks. The book is written primarily for Bavarian foresters. Most research and practice is drawn from German and Swiss sources. There are many references to Scandinavian, Finnish, and Russian forestry, but only a few to French, British, and American literature.

Silvics, nursery, planting, and cutting practices are covered. About one-half of the book is devoted to silvics and one-half to the various practices. Considerable space is given to forest sociology, while relatively little to silvicultural systems in the traditional sense. Wagners border cutting (*Blendersaumschlag*), which has occupied numerous tons of paper in the German forest literature during the past decades, is disposed of on about one-half page. All intermediate cuttings are classed under cleaning and thinning, and very limited data on planting practices are included.

Köstler presents a kind of silviculture that finds many proponents in the region in which he works. He declares himself a follower of Karl Gayer, (the back-to-nature advocate): "the basic theory of Gayer in silvicultural technique still remains valid today." He believes in the mixed forest, the uneven-aged stand, and the native species. He conducts war on the pure even-aged spruce stands throughout the book and devotes very little space or enthusiasm to exotics. The perpetual or continuous forest and its history is discussed at length, and the selection forest is treated as "the ideal silvicultural procedure."

The historic approach is used to many subjects. Gayer is consulted first of all and frequently the views of more recent silvicultural text-

book writers like Bühler, Dengler, and Oelkers, are cited before Köstler's own views, supported by contemporary research or practice, are advanced. This is a useful presentation in particular for readers who are not thoroughly familiar with German forestry literature.

Authorities are cited throughout the book by name but not by year. At the beginning of every chapter a group of selected literature is given. This method makes it sometimes difficult for the reader to reach the real source.

Köstler's book brings the English speaking readers silvicultural knowledge and experience from central Europe that will be new and stimulating to many. It brings much classical and recent research that has not been easily available before. It brings experiences and views from economic environments that may seem strange to many. But it all comes from a part of the world where today and for a long time man has worked intensively with silviculture.

Svend O. Heiberg
College of Forestry, Syracuse, N. Y.

Water for America

By Edward H. Graham and William R. Van Dersal. 112 pp. Illus. Oxford University Press, New York, N. Y. 1956. $3.50.

Subtitled—*The Story of Water Conservation*, this slim volume is delightfully written, beautifully illustrated, and commendably brief. The book packs a tremendous lot of information between its covers.

Both Graham and Van Dersal are able technicians (Soil Conservation Service) and skillful writers. This survey must have involved a terrific job of condensation, but they brought it off.

Not a book for the water management specialist, it is apparently designed for the layman seeking knowledge about water or the junior high school student. Although its treatment of the subject is elementary, the text is scientifically sound.

There are 52 separate items about water—one to a page—and facing each page of text is an illustration. Text and photographs compliment each other beautifully.

We learn about where water comes from, how it is stored in the earth, its importance to agriculture, industry, and the home, and how it can be controlled and made more useful. The page on "Treating a Watershed" (it is really too short to be called a chapter) is an eminently clear, if brief, explanation of watershed conservation. Likewise the page "People Working Together" tells simply but plainly the whys and wherefores of watershed associations.

Graham and Van Dersal have also written *The Land Renewed* and *Wildlife for America* for the series "Stories of Conservation," published by Oxford University Press.

Memo to the authors: Keep them coming.

Henry Clepper

Publications of Interest

There have been a number of recent European research reports on the use of commercial fertilizers in forestry. One new publication of particular interest by H. Mayer-Krapoll (1956) *Die Anwendung von Handelsdüngemitteln Insbesondere von Stickstoff in der Forstwirtschaft*, 126 pp., illus., Ruhr-Stickstoff, Bochum, describes many of these experiments and also reports new research particularly in the use of nitrogen to stimulate forest growth and reactivate raw humus. There are eleven chapters with specific recommendations for soil management practices in nurseries, plantations, and forest stands. Practices on special use areas such as forest pastures, dunes, and heaths are covered. Of particular interest is a chapter on fertilizing game browsing areas. A translation of this valuable bulletin has been printed by the Nitrogen Division of the Allied Chemical and Dye Corporation, 40 Rector Street, New York 6, New York, and copies are available upon request.

* * *

Operation Outdoors: Part 1, National Forest Recreation outlines a five-year program for development of recreation facilities on national forests by the U. S. Forest Service. Goals to be accomplished by 1962 include rehabilitating existing recreation facilities and the planning and development of new areas to alleviate present overuse and accommodate future use.

"Operation Outdoors" is being developed in two separate parts. Part 2, to be released at a later date, will deal with improvement and management of wildlife habitat in cooperation with state fish and game departments.

Part 1 is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. at 20c per copy.

* * *

L. G. Sorden, a member of the staff of the College of Agriculture, University of Wisconsin, and Mrs. Isabel J. Ebert of Tomahawk Lake, Wis., have made a study of the language of the lumberjack and collected their findings into a booklet entitled *Logger's Words of Yesteryears.*

The authors do not claim that the list is a complete one, for terminology differs greatly from time to time and in different places. The list includes about 1,200 terms which were in common usage between the years 1850 and 1920 in the Lake States region. Research was begun by the authors in the 1930's as a part of the logging museum at Rhinelander, Wis.

Copies of the 44-page booklet may be obtained from Mr. Sorden, 212 North Allen Street, Madison, Wis., for 50 cents.

* * *

The Oregon State Board of Forestry has announced that copies are again available of its Bulletin No. 4, *Conk Rot of Old-Growth Douglas-fir in Western Oregon*, by John S. Boyce and J. W. Bruce Wagg.

Copies of this bulletin, a joint research project and joint publication of the Oregon Forest Products Laboratory and the Research Division of the Oregon State Forestry Department in 1953, have not been available for some time.

Requests for the bulletin should be sent to the Oregon State Board of Forestry at Salem. Copies will be distributed without charge within the state. Elsewhere there will be a charge for more than two copies.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by Division of Bibliography, Library, U. S. Department of Agriculture

General

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Publications of the Lake States Forest Experiment Station 1923-1955. Assembled by L. P. Olsen and H. A. Woodworth. 130 pp. St. Paul. 1956. Station Paper No. 39. Mimeog.

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The Effect of Clearcutting and Soil Disturbance on Temperatures Near the Soil Surface in Southeast Alaska. By R. A. Gregory. 22 pp. Illus. Alaska Forest Research Center, Juneau. 1956. Sta. Paper No. 7. Mimeog.

Evaluating Summer Water Deficiencies. By Robert Zahner. 18 pp. Illus. Southern Forest Expt. Sta., New Orleans. 1956. Occasional Paper No. 150. Mimeog.

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Forest Management

Cull Factors for Sitka Spruce, Western Hemlock and Western Redcedar in Southeast Alaska. By J. W. Kimmey. 31 pp. Illus. Alaska Research Center, Juneau. 1956. Sta. Paper No. 6. Mimeog.

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Forest and Land Use Trends from Aerial Photographs 1943-1953 Town of Madbury, New Hampshire. By Carter Gibbs and Bertram Husch. 3 pp. New Hampshire Agric. Expt. Sta., Durham. 1956. For. Mimeog. No. 3.

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A Comparison of two Log-Grading Systems. By C. S. Walters and A. M. Herrick. 23 pp. Univ. of Illinois Agric. Expt. Sta. Urbana. 1956. Bul. No. 603.

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Insect Damage and its Prevention in Windthrown Saw Timber. By D. P. Connola, D. L. Collins, J. H. Risley, and W. E. Smith. 36 pp. Illus. New York State Museum and Science Service, Albany. 1956. Bul. No. 352.

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Growing Loblolly and Shortleaf Pine in The Mid-South. By C. X. Grano. 25 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. Farmers' Bul. No. 2102. 15 cents (Govt. Print. Off.)

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E. F. Heacox

Committee on Forestry Career Counselling

T. D. Stevens, chairman; Department of Forestry, Michigan State College, East Lansing, Mich.

R. I. Ashman

Wilbur B. DeVall

G. D. Marckworth

E. R. Martell

Lewis M. Turner

R. H. Westveld

Nominating Committee

J. H. Johnson, chairman; Chesapeake Corporation, West Point, Va.

S. T. Carlson

Albert Engstrom

James E. Sowder

Harry E. Troxell

Section Officers

(As of February 1, 1957. Dates terms began are given.)

Allegheny Section

1-1-57

Ralph C. Wible, Chairman
Department of Forests and Waters, Harrisburg, Pa.
W. W. Ward, Vice Chairman
Pennsylvania State Forest School, Mont Alto, Pa.
Paul Felton, Secretary-Treasurer
Valley Forge Dist., Department of Forests and Waters, Port Kennedy, Pa.
W. W. Ward, Membership Chairman
Pennsylvania State Forest School, Mont Alto, Pa.
Chapters: 1. New Jersey
2. Philadelphia
3. West Virginia

Appalachian Section

1-19-57

T. E. Maki, Chairman
School of Forestry, North Carolina State College, Raleigh, N. C.
H. F. Lathrop, Vice Chairman
Lightsey Brothers, Miley, S. C.
W. T. Ahearn, Secretary-Treasurer
Box 357, Columbia, S. C.
H. F. Lathrop, Membership Chairman
Lightsey Brothers, Miley, S. C.
Chapters: Winyah

Central Rocky Mountain Section

7-1-56

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Kremmling Timber Co., Kremmling, Colo.
Gordon A. Ince, Vice Chairman
Box 1066, Colorado Springs, Colo.
Robert R. Alexander, Secretary-Treasurer
Rocky Mt. Forest & Range Expt. Station, Forestry Building, Colorado A & M College, Fort Collins, Colo.
Gordon A. Ince, Membership Chairman
Box 1066, Colorado Springs, Colo.

Central States Section

9-10-56

Charles S. Walters, Chairman
University of Illinois, 219 Mumford Hall, Urbana, Ill.
A. M. Herrick, Vice Chairman
Dept. Forestry & Conservation, Purdue University, Lafayette, Ind.
Alfred N. Liming, Secretary-Treasurer
Tyson Library, Versailles, Ind.
A. M. Herrick, Membership Chairman
Dept. Forestry & Conservation
Purdue University, Lafayette, Ind.
Chapters: 1. Illinois Technical Forestry Association
2. Indiana
3. Ohio

Columbia River Section

7-1-55

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4175 Hillview Road, Corvallis, Ore.
C. Weldon Cline, Vice Chairman
18 South Groveland, Medford, Ore.
John Bell, Secretary
State Forestry Dept., 2600 State St., Salem, Ore.
William J. Sauerwein, Treasurer
145 N. 16th Street, Corvallis, Ore.
Robert D. Hostetter, Membership Chairman
1420 Olive Street, Salem, Ore.
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2. Central Oregon
3. Hawaii
4. Longview
5. Portland
6. Shasta-Cascade
7. Siskiyou
8. Tillamook-Clatsop
9. Umpqua-Coquille
10. Willamette

Gulf States Section

5-10-56

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Wm. F. Mann, Jr., Vice Chairman
6230 Boeuf Trace, Rt. 1, Alexandria, La.
Hal E. Townsend, Jr., Secretary-Treasurer
Box 985, NSC, Natchitoches, La.
Wm. F. Mann, Jr., Membership Chairman
6230 Boeuf Trace, Rt. 1, Alexandria, La.
Chapters: 1. Mississippi
2. Texas

Inland Empire Section

7-3-56

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Richard Schaertl, Secretary-Treasurer
P.O. Box 366, Coeur d'Alene, Idaho
Melvin R. Carlson, Membership Chairman
126 Garfield, Moscow, Idaho
Chapters: None

Intermountain Section

3-10-56

George V. Hjort, Chairman
801 North 17th St., Boise, Idaho
Harry W. Camp, Jr., Vice Chairman
Intermountain Forest Expt. Sta., Forest Service Bldg., Ogden, Utah.
Archie D. Craft, Secretary-Treasurer
3005 Kootenai, Boise, Idaho
Harry W. Camp, Jr., Membership Chairman
Intermountain Forest Expt. Sta., Forest Service Bldg., Ogden, Utah.
Chapters: 1. Southwestern Idaho

Kentucky-Tennessee Section

12-7-56

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U. S. Forest Service, P. O. Box 56, Winchester, Ky.
Russell Stadelman, Vice Chairman
Nickey Bros., Inc., 2700 Summer Avenue, Memphis 12, Tenn.
James A. Newman, Secretary-Treasurer
Dept. of Horticulture, University of Kentucky, Lexington, Ky.
Russell Stadelman, Membership Chairman
Nickey Bros., Inc., 2700 Summer Avenue, Memphis 12, Tenn.
Chapters: None

New England Section

3-9-56

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School of Forestry, Yale University, New Haven, Conn.
Fred Holt, Secretary-Treasurer
Maine Forest Service, Augusta, Maine
David M. Smith, Membership Chairman
School of Forestry, Yale University, New Haven, Conn.

Chapters: 1. Granite State
2. Vermont

New York Section

1-19-56

Ralph G. Unger, Chairman
109 Ramsey Avenue, Syracuse 3, N. Y.
Stanley W. Hamilton, Vice Chairman
89 Ludlow St., Saratoga Springs, N. Y.
C. E. Farnsworth, Secretary-Treasurer
1219 Lancaster, Syracuse 10, N. Y.

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2. Black River Valley
3. Capital District
4. Iroquois
5. Longhouse
6. Metropolitan
7. Mid-Hudson
8. Upper Hudson

Northern California Section

3-1-56

Myron S. Wall, Acting Chairman
524 56th St., Sacramento 19, Calif.
Myron S. Wall, Vice Chairman
524 56th St., Sacramento 19, Calif.
Edwin E. Sechrist, Jr., Treasurer
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William T. Jacobson, Secretary
2235 Weldon Ave., Fresno 3, Calif.
Jack Cameron, Membership Chairman
Land Dept., Pacific Gas & Electric Co., 245 Market St., San Francisco, Calif.

Chapters: 1. Bay Area
2. Eldorado-Amador
3. Feather River
4. Lassen-Almanor Forum
5. North Coast Forest Forum
6. Redding
7. Sacramento
8. San Joaquin

Northern Rocky Mountain Section

5-19-56

Paul E. Bruns, Chairman
119 Mount Ave., Missoula, Mont.
Geo. R. Fahnestock, Vice Chairman
Rt. 1, Pineville, La.
Franklin H. Blackmer, Secretary-Treasurer
625 Hastings, Missoula, Mont.
William R. Price, Membership Chairman
439 University, Missoula, Mont.

Chapters: 1. Libby

Ozark Section

7-1-56

John C. Burwell, Chairman
Dierks Forests, Inc., Idabel, Okla.
Nelson F. Rogers, Vice Chairman
900 East 1st, Salem, Mo.
M. G. Hoyer, Secretary-Treasurer
Forestry Div., Missouri Cons. Com., Jefferson City, Mo.

Alois C. Pakula, Membership Chairman
Box 594, Vet Village, Stillwater, Okla.
Chapters: None

Puget Sound Section

7-1-56

L. O. Barrett, Chairman
415 Federal Office Bldg., Seattle 4, Wash.
Donald L. Fraser, Vice Chairman
Division of Forestry, Olympia, Wash.
Gordon Grayum, Secretary-Treasurer
Box 8, Steilacoom, Wash.
Philip G. Haddock, Vice Chairman for British Columbia
Faculty of Forestry, University of British Columbia, Vancouver 8, Canada
Eugene V. Zumwalt, Vice Chairman for Alaska
Bureau of Land Management, Box 120, Anchorage, Alaska
Donald L. Fraser, Membership Chairman
Division of Forestry, Olympia, Wash.
Chapters: 1. Alaska
2. Central-Washington
3. Mid-Columbia
4. North Olympic
5. North Puget Sound
6. Southwest Washington

Southeastern Section

2-1-57

F. Herbert Robertson, Jr., Chairman
Rt. #1, Box 158, Panama City, Fla.
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Grayson, Alabama
James F. Goggans, Secretary-Treasurer
Department of Forestry, Alabama Polytechnic Institute, Auburn, Alabama
Henry A. Wilson, Membership Chairman
Grayson, Alabama
Chapters: 1. Alabama
2. Florida
3. Georgia

Southern California Section

7-25-56

David H. Rogers, Chairman
914 W. Highland Ave., Redlands, Calif.
Oliver Holmes, Vice Chairman
U. S. Forest Service, Mentone, Calif.
Lynn R. Biddison, Secretary-Treasurer
Lytle Creek, Star Rt. Box 100, Fontana, Calif.
Oliver Holmes, Membership Chairman
U. S. Forest Service, Mentone, Calif.
Chapters: None

Southwestern Section

7-1-56

Clarence K. Spaulding, Chairman
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D. D. Cutler, Vice Chairman
1004 Spruce Ave., Alamogordo, New Mex.
Norman P. Weeden, Secretary-Treasurer
4020 Mescalero Rd. N. E., Albuquerque, New Mex.
Edgar H. Palpant, Membership Chairman
Rocky Mt. Forest Experiment Station, Building T-10, Univ. of New Mexico, Albuquerque, New Mex.
Chapters: None

Upper-Mississippi Valley Section

11-1-54

Zigmond A. Zasada, Chairman
Lake States Forest Experiment Station, Grand Rapids, Minn.
D. W. Bensend, Vice Chairman
Department of Forestry, Iowa State College, Ames, Iowa
Earl J. Adams, Secretary-Treasurer
4705 10th Avenue, South, Minneapolis, Minn.
John Hubbard, Membership Chairman
Box 325, Big Falls, Minn.
Chapters: 1. Iowa
2. Lake Superior
3. North Dakota
4. Northwest Minnesota
5. Southern Minnesota

Washington Section

7-1-56

Albert W. Sump, Chairman
U. S. Forest Service, Washington 25, D. C.
Gordon R. Heath, Vice Chairman
U. S. Forest Service, Washington 25, D. C.
Glen A. Thompson, Secretary-Treasurer
616 Belle View Blvd., Apt. B-1, Alexandria, Va.
E. H. Clocker, Membership Chairman
Forest Service, U. S. Dept. of Agriculture, Washington 25, D. C.
Chapters: None

Wisconsin-Michigan Section

7-1-56

T. D. Stevens, Chairman
Department of Forestry, Michigan State University, East Lansing, Mich.
John Macon, Vice Chairman
Con. Water Power & Paper Pulp Co., Rhinelander, Wis.
Paul R. Flink, Secretary-Treasurer
Forestry Division, Department of Conservation, Lansing 26, Mich.
John Macon, Membership Chairman
Con. Water Power & Paper Co., Rhinelander, Wis.
Chapters: 1. Hiawatha
2. Lower Michigan
3. Madison
4. Milwaukee
5. Northeastern Wisconsin

Second Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 2, 1957. A president, vice president, and nine other members of the Council will be elected for the two-year term 1958-1959.

The present Council is listed in the box on page 225. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

President DeWitt Nelson has announced that he will not be a candidate for re-election.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for over two decades.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 18, 1957.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1958-1959.

All nominating petitions should be sent promptly to the Society office. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Nelson. The Committee is composed of the following members:

Chairman, J. H. Johnson. Chesapeake Corp. of Virginia, Box 534, West Point, Va.

S. T. Carlson, National Park Service, P. O. Box 1728, Santa Fe, N. Mex.

Albert Engstrom, Oklahoma Division of Forestry, Capitol Building, Oklahoma City, Okla.

James E. Sowder, Deschutes Research Center, U. S. Forest Service, Bend, Ore.

Harry E. Troxell, School of Forestry, Colorado A & M College, Fort Collins, Colo.

This committee is charged with the following duties:

1. To set the date of the election. (December 2, 1957 is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations. For their information the distribution of Council members by states during the period 1942-1957 is shown on page 154 of the February issue of the JOURNAL.

Nominations Received

Up to the time of going to press the following nominations had been received:

For President

Henry J. Malsberger, Atlanta, Ga.

For The Council

M. K. Goddard, Harrisburg, Pa. (Council member, 1956-1957.)

P. L. Lannan, Georgetown, S. C.

J. H. JOHNSON, *chairman,*
Nominating Committee

Second Call for Fellow Nominations

All Members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 2, 1957.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters of outstanding achievement as leaders in responsible directive or distinctive individual work of a fruitful character. They shall be elected from the Members and shall be engaged in forestry work at the time of their election."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters, hereby nominate John Doe for election to the grade of Fellow in 1957.

Remember these simple rules:

1. A petition may not name more than one candidate.

2. It must be signed by 25 Members or Fellows in good standing.

3. It should be accompanied by a factual, not eulogistic, biographical sketch of at least 200 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society in Washington, D. C., not later than September 18, 1957.

The executive employees of the Society cannot be responsible for ob-

taining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing).

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows and the present Council. (A Council member who is also a Fellow has but one vote.)

The system is described in Article IV, Section 4 of the Constitution. To win election a candidate must receive an affirmative vote of not less than one-half the total votes cast.

During 1957, the voting membership of the Society will have an opportunity to ballot on a proposal by the Council that would increase the number of Fellow electors. If the referendum is approved, the chairmen of the 21 Sections and the chairmen of the 11 subject Divisions, a total of 32 electors, will cast votes for Fellows in addition to the present Fellows and the Council. For a detailed discussion of this proposal members are referred to the JOURNAL for April 1956, page 279, and for June 1956, page 410.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding achievement. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 109 Fellows elected. At the present time the number of living Fellows is 75.

List of Fellows

The current roster of Fellows follows. The state in which each Fellow is domiciled and the year of his election are shown after his name.

Allen, Shirley W. Michigan. 1948.

Bailey, Reed W. Utah. 1955.
Baker, Frederick S. California, 1949.
Besley, Fred W. Maryland. 1940.
Boyce, John S. Connecticut. 1955.
Brundage, Frederick H. Oregon. 1949.
Butler, Ovid. Maryland. 1940.

Carter, E. E. District of Columbia. 1942
Chapman, Herman H. Connecticut. 1922.
Clapp, Earle H. District of Columbia. 1930.
Clepper, Henry E. Virginia. 1949.
Coffman, John D. California. 1946.
Cox, William T. Minnesota. 1953.
Curran, Hugh. Venezuela. 1951.

Damtoft, Walter J. North Carolina. 1951.
Dana, Samuel T. Michigan. 1935.
Demeritt, Dwight B. Maine. 1955.
Demmon, Elwood L. North Carolina. 1951.
Detwiler, Samuel B. Colorado. 1955.
Drake, George L. Washington. 1953.

Eldredge, Inman F. Lousiana. 1942.
Evans, Charles F. Georgia. 1949.
Evenden, J. C. Idaho. 1953.

Ferguson, J. A. Pennsylvania. 1949.
Fischer, Arthur F. California. 1940.
Fontanna, Stanley G. Michigan. 1955.
Fritz, Emanuel. California. 1951.
Frothingham, E. H. California. 1942.

Garratt, George A. Connecticut. 1953.
Gill, Tom. District of Columbia. 1948.
Granger, Christopher M. Maryland. 1946.
Guise, Cedric H. New York. 1951.
Guthrie, John D. Virginia. 1942.

Hall, J. Alfred. Wisconsin. 1955.
Hall, William L. Arkansas. 1940.
Hartley, Carl P. Maryland. 1949.
Hawes, Austin F. Connecticut. 1939.
Hawley, Ralph C. Connecticut. 1942.
Heintzleman, B. Frank. Alaska. 1951.
Holmes, J. S. North Carolina. 1939.
Hosmer, Ralph S. New York. 1932.
Hunt, George M. Wisconsin. 1951.

Illick, Joseph S. New York. 1946.
Isaac, Leo A. Oregon. 1953.

Jeffers, Dwight S. Oregon. 1948.

Kaufert, Frank H. Minnesota. 1955.
Keen, Frederick P. California. 1955.
Kelley, E. W. California. 1949.
Kellogg, Royal S. Florida. 1949.
Kinney, Jay P. New York. 1942.
Kittredge, Joseph. California. 1953.
Korstian, Clarence F. North Carolina. 1942.
Krueger, Myron E. California. 1951.

Lowdermilk, Walter C. California. 1948.

MacDonald, G. B. Iowa. 1944.
Marckworth, Gordon D. Washington. 1955.
Marsh, Raymond E. District of Columbia. 1948.
Martin, Clyde S. Washington. 1948.
Mason, David T. Oregon. 1948.
McArdle, Richard E. District of Columbia. 1953.
Metcalf, Woodbridge. California. 1953.
Morrell, Fred W. Virginia. 1951.
Munger, Thornton T. Oregon. 1946.
Munns, Edward N. California. 1949.

Preston, John F. District of Columbia. 1948.
Price, Jay H. Arizona. 1951.

Schmitz, Henry. Washington. 1940.
Shirley, Hardy L. New York. 1951.
Show, S. B. California. 1948.
Siecke, E. O. Texas. 1946.
Sparhawk, William N. New Hampshire. 1946.

Watts, Lyle F. Oregon. 1946.
Winslow, C. P. Washington. 1942.
Wirt, George H. Pennsylvania. 1948.

Ziegler, E. A. Pennsylvania. 1949.

Lower Michigan Chapter Has Winter Meeting

One hundred members and guests attended the Lower Michigan Chapter meeting at Grayling, Mich., December 7 and 8. A panel discussion of pulpwood supplies and demands was a scheduled event, but it never got under way because of a spirited business meeting. The main point of controversy concerned the type of experience necessary for qualification as a Registered Forester under Public Act 78 in Michigan. During the past year the registration board required experience in the recognized and conventional fields of forestry. Some members stated the work of arborists, municipal foresters, highway foresters, and tree or line clearance specialists should also be acceptable for the experience requirement of the Registration Act. After much discussion it was voted that the Chapter reaffirm its opinion that neither arboricultural nor tree clearance experience should be acceptable as qualifying.

Other items of business were the consideration and the passing of three resolutions concerning the taxation of forest lands in Michigan. The first recommended the formation of a forest taxation study committee of the Michigan State Legislature. The second recommended a change in the section of the state tax commission manual on Christmas tree farms in accordance with the recommendations of the Chapter's committee on taxation. In the third resolution it was stated that the Chapter opposed any changes at this time in either the specific tax or the yield tax as now specified in the Commercial Forest Reserve Act.

With this meeting Leslie Gysel and Keith Hudson stepped down as chairman and secretary-treasurer. John Fields takes over as the 1957 chairman with Ronald Auble as vice-chairman and Paul Guilkey, secretary-treasurer.

The President's Column

DEWITT NELSON

No longer is cotton king of the South's economy. It has been replaced by the pine tree.

In January I had the privilege of attending the Southeastern Section meeting in Athens where we celebrated the Golden Anniversary of the George Foster Peabody School of Forestry at the University of Georgia. I also got into the south coastal region of the state and over some of the properties and operations of the Union Bag and Paper Corporation. I saw the mountain of wood that goes into that plant every day of the year and mentally multiplied it by the 67 primary pulp and paper mills of the region. What a job foresters have ahead of them to keep that raw material growing and moving to the mills. Next year southern foresters expect to plant over one billion seedlings. In thirty years those seedlings should make pulp with possibly some commercial thinnings in the meantime.

At the meeting, J. E. McCaffrey, vice president of International Paper Company, gave an excellent paper on "The Influence of the Pulp and Paper Mills in Southern Forestry." You will be interested in some of his facts and figures. Our per capita consumption of paper and paper products has risen from 230 pounds to over 400 pounds since 1937.

During the last fifty years—since 1907—he stated, "the number of mills has risen from four to 67; consumption of pulpwood mounted from 85,000 cords in 1907 to more than 20 million cords in 1956. Pulpwood consumption has more than doubled since 1949. Wood pulp production was 50,000 tons in 1907—today it is around 12 million tons—more than half the national production. The wood pulp capacity of southern mills has tripled since 1939."

Apparently more mills are in the planning stage. I could not but raise the question, "Where is the saturation point and what about sawlog production?" Every one seemed confident that they can produce raw material necessary to meet the increasing production demands. There are other problems of which fire prevention and control are of major importance.

As Mr. McCaffrey pointed out, Captain I. F. Eldredge summed up forestry in the South when he recently stated, "It can be said without fear of contradiction that the long delayed blossoming of the application of forestry in the South has been due to the great expansion of the pulp and paper industry in that region during the past 25-year period."

It is the story of men and trees. Foresters are doing a real job down there. More foresters will be needed to keep that mountain of wood pulp moving to the mills.

DeWitt Nelson

Appalachian Section Holds Winter Meeting

Approximately 125 members of the Appalachian Section met in the Hotel Jefferson, Richmond, Va. for the winter meeting of the Section held January 18-19.

An afternoon's general session included the following subjects: William Cooper, Virginia Forests, Inc., described "The Plant More Trees Program in Virginia." Carl Holcomb, extension forester for the State of Virginia, discussed forestry applications of the Soil Bank Program. Dr. Bruce Zobel of the North Carolina State College described the research program in forest genetics being initiated by that institution in conjunction with the forestry industry. The program of forest regeneration being carried out in Carolina-Georgia and hill projects was described by Thomas Lotti and John Hatcher of the U. S. Forest Service.

Virginia State Forester George W. Dean served as master of ceremonies at the evening banquet at which U. S. Congressman Watkins J. Abbitt, Appomattox, Va., made the principal address. "Man of the Year" awards in forestry were announced by awards committee chairman Roger Wolcott of the North Carolina Forestry Association. Chosen for this year's honors were E. L. Demmon, retired director of the Southeastern Forest Experiment Station, and Monroe Greene, Siebels Bruce & Co., for his work in promoting forest fire insurance.

Various Section and Society matters, including discussion of proposed membership changes, were handled at the business meeting of the following morning which was conducted by Section Chairman P. T. Lannan. The following slate of officers, elected by mail ballot, was announced:

Chairman—T. E. Maki, N. C. State College, School of Forestry, Raleigh.

Vice Chairman—H. F. Lathrop, Lightsey Brothers, Miley, S. C.

Executive Committee—R. N. Hoskins, Seaboard Air Line Railroad Co., Norfolk, Va. and P. T. Lannan, Jr., W. Va. Pulp & Paper Co., Georgetown, S. C.

Secretary-Treasurer—W. T. Ahearn, S. C. Commission of Forestry, Columbia, S. C.

A Forestry Program for Minnesota

The Upper Mississippi Section has published *A Forestry Program for Minnesota*. It is a 36-page printed bulletin, prepared by a 15-member committee of which F. T. Frederickson is chairman, and Richard L. Knox, secretary.

The *Program*, a revision of one issued by the Section in 1950, reviews the forestry activities in the state and makes recommendations. It has a foreword by Z. A. Zasada, Section chairman.

The Upper Mississippi Valley Section includes Iowa, Minnesota, and North Dakota, with a membership of more than 400. About 75 percent of the members live and work in Minnesota. Chairman Zasada reports that the membership has adopted the program and is now working to make the recommendations effective.

High commendation is due the Forestry Program Committee that compiled this excellent document. It could well serve as a model for other Sections.

Requests for copies should be sent to Z. A. Zasada, Lake States Forest Experiment Station, Headwaters Research Center, Grand Rapids, Minn.

Charles A. Ott (1923-1956)

Charles A. Ott of Florence, Wis. was drowned October 13 while on a hunting trip. He was 33 years old.

Ott was a graduate of the University of Michigan in 1949. That year he received both his bachelor's and master's degrees. He joined the Society in 1949.

Gerald E. Wing (1903-1956)

Gerald E. Wing, 53, died November 30 at Winslow, Maine. At the time of his death he was manager of woodlands, H & W. Division, Scott Paper Co., in Winslow.

Wing received his bachelor's degree in forestry at the University of Maine in 1926 and completed work for the master's degree at Yale in 1928. He had been a member of the Society since 1929.

Charles A. Beck (1901-1956)

Charles A. Beck died November 29 in Baltimore, Md. at the age of 55.

Beck was Wood Department manager of West Virginia Pulp and Paper Co. in Luke, Md.

He became an Affiliate Member of the Society in 1950.

Necrology, 1956

Fellow

Zon, Raphael, St. Paul, Minn.

Member

Buckland, Donald C., Vancouver, Canada
Burns, Kendrick, Cumberland Mills, Maine
Chandler, B. A., Washington, D. C.
Chapman, Gordon L., Orono, Maine
Clark, Elias T., Seattle, Wash.
Colman, Edward A., Berkeley, Calif.
Conzet, Grover M., Decatur, Ga.
Cruikshank, James W., Asheville, N. C.
Curtis, Floyd C., St. Maries, Idaho
Foster, John H., Concord, N. H.
Frankland, James, Portland, Ore.
Gilmour, John D., Montreal, Canada
Hopson, Mark C., Jasper, Ark.
Jefferson, Frank J., Corte Madera, Calif.
Kiefer, Francis, Marysville, Mich.
Kreutzer, William R., Fort Collins, Colo.
Leonard, R. Boyd, Cedar City, Utah
McCarthy, Edward F., Chittenango, N. Y.
Munster, Norman L., Washington, D. C.
Ott, Charles A., Florence, Wis.
Richwine, L. L., Spencer, Idaho
Shaw, Earle E., Valois, Canada
Shaw, Prof. T. E., Lafayette, Ind.
Shulley, Frederick J., San Francisco, Calif.
Springer, Willard, Jr., Wilmington, Del.
Weddell, Donald J., Athens, Ga.
Wing, Gerald E., Winslow, Maine
Winters, Donald W., Murphysboro, Ill.
Wirka, R. M., Arlington, Va.

Junior

Harding, Alexander J. R., Bellmore, N. Y.
Morse, Paul E., Jr., Jamestown, N. Y.
Ward, Rodney L., New Lisbon, N. J.

Student

Haley, Jack E., Auburn, Ala.

Affiliate

Beck, Charles A., Baltimore, Md.
Bemis, D. K., Prescott, Ark.
Erambert, Gerald F., Brooklyn, Miss.
Meeley, Joe M., Sappho, Wash.
Shepard, Arthur L., Long Beach, Miss.
Welch, Henry E. Jackson, Miss.

Associate

Honey, Edwin E., State College, Pa.
Reid, Kenneth A., Connellsville, Pa.

Corresponding

Guerrero, Salvador, Mexico City, Mexico
Jagerschmidt, Jean J., Paris, France.
Lahav, Arieh, Jerusalem, Israel

TABLE 1.—MEMBERSHIP BY SECTIONS (DECEMBER 31, 1956)

Section	Rank	Total	Junior	Member	Fellow	Affiliate	Associate	Student
1. Allegheny	7	674	313	253	4	19	13	72
2. Appalachian	5	735	300	335	5	31	4	60
3. Central Rocky Mountain	15	254	78	133	1	5	5	32
4. Central States	12	409	165	163	1	16	9	55
5. Columbia River	2	1,115	529	448	6	66	18	48
6. Gulf States	3	866	374	293	1	108	22	68
7. Inland Empire	20	218	100	85	2	8	6	17
8. Intermountain	17	225	80	108	1	4	1	31
9. Kentucky-Tennessee	19	224	87	116	—	13	8	—
10. New England	9	595	196	262	7	63	13	54
11. New York	11	416	123	212	5	18	15	43
12. Northern California	4	792	328	332	9	50	20	53
13. Northern Rocky Mountain	14	277	111	101	—	14	5	46
14. Ozark	13	402	141	134	1	61	6	59
15. Puget Sound	8	663	303	234	5	75	13	33
16. Southeastern	1	1,227	600	407	2	48	23	147
17. Southern California	21	101	45	46	2	5	3	—
18. Southwestern	18	225	90	107	1	25	2	—
19. Upper-Mississippi Valley	10	437	146	174	3	23	12	79
20. Washington, D. C.	16	249	36	175	11	2	25	—
21. Wisconsin-Michigan	6	719	270	283	4	55	15	92
No Section Affiliation[1]		202	69	123	4	4	2	—
Corresponding Members		67	—	—	—	—	—	—
Honorary Members		20	—	—	—	—	—	—
Total Membership		11,112	4,484	4,524	75	713	240	989

[1]Includes members in U. S. and foreign countries who have requested that they not be designated members of any Section.

Advertising Rate Increase for Journal of Forestry

Effective February 1, 1957 advertising rates for the JOURNAL OF FORESTRY were increased about 27 percent. In 1930 the page rate was $50; in 1939, $100; in 1952, $120; in 1954, $150. On February 1st the rate was advanced to $200 per page.

Because of the rapid rise in the circulation of the JOURNAL OF FORESTRY, including membership and subscriptions, and the expanded coverage of the field of forestry an adjustment in advertising rates has been indicated for some time. As the only professional forestry magazine published in the United States and a recognized leader in its field throughout the world, the JOURNAL OF FORESTRY offers to potential advertisers, a direct approach to a forestry market expending millions of dollars annually. For 1956, gross

advertising cash income was almost $32,000. For 1957 an income of over $33,000 from this source, is expected.

Society members are requested to recommend the JOURNAL OF FORESTRY as a advertising medium to manufacturers of forestry equipment, supplies, and tools. Rate cards and other information about how the JOURNAL OF FORESTRY covers the forestry market, can be obtained from Lloyd Thorpe, advertising representative, 6133 Arcade Building, Seattle 1, Washington or from the Society office.

Membership Now Exceeds 11,000

Total Society membership, as of December 31, 1956, was 11,112—a net increase of 501 over 1955. On December 31, 1955 total membership was 10,611. During 1956 a total of 1,128 names (including 105 reinstatements) was added to the membership list. Terminations for the same period were 614, of which 461 were dropped for nonpayment of dues. Membership figures for the 5-year period follow:

Year	*Membership*
1952	9,087
1953	9,557
1954	9,919
1955	10,611
1956	11,112

As of December 31, 1956 there were 989 Student Members — the highest number, at the same period, since the initiation of this grade. The next highest were 805 for 1955; 625 for 1954; and 566 for 1952. A significant increase is in the grade of Member. Only once or twice before in the Society's history, have the Members outnumbered the Juniors. This increase was the result of a letter sent to qualified Juniors suggesting application for regular advancement to the grade of Member. A response of about 35 percent was received indicating the Junior's willingness voluntarily to assume the increased dues and responsibilities of the higher grade.

Shown in Table 1 is a tabulation of membership by Sections. It is suggested that Section officers compare this tabulation with those published in the April (p. 280) and August (p. 610) 1956 issues of the JOURNAL OF FORESTRY.

Of interest also is Table 2 showing 1955, 1956 income and expense and 1957 budget. Net earnings for 1956 were $6,582. For the 5-year period ending November 30, 1956, net earnings total approximately $24,000.

The membership goal now is 12,000 which can only be obtained by the continued cooperation of the Sections, Chapters, and members of the Society. We need to add to Society membership at least 1,500 names in the initial grades (Student, Junior, Affiliate, Associate and reinstatements) to effect a *net* increase of about 900, bringing the total membership to 12,000.

100 Percent Student Membership

Congratulations go to the School of Forestry, University of Florida, and the Department of Forestry, University of Missouri, for 100 percent enrollment of eligible students as Student Members of the Society of American Foresters. Advise the Society office if your school has met its goal of 100 percent.

There has been a noticeable increase in the receipt of Student Member applications since the beginning of the 1956 fall term. More and more students appear to be realizing the many advantages of Society membership—particularly the financial one—which permits a Student Member to be automatically advanced, upon graduation to the grade of Junior Member without payment of admission fee or additional dues for the remainder of the year in which he was graduated.

Forestry students in their Junior or Senior year, enrolled in an institution accredited by the Society and studying an approved curriculum, are eligible for Student Membership. They receive the JOURNAL OF FORESTRY—regular annual subscription rate is $7.50 per year —and are also members of the Section in which territory their school is located. Annual Student Membership dues are only $3.

TABLE 2.—1955, 1956 INCOME AND EXPENSE AND 1957 BUDGET

INCOME

	1955	1956	Budget 1957
Dues	$ 92,496	$100,829	$105,000
Fee	1,635	1,636	1,700
Subscriptions, sales JOURNAL OF FORESTRY	9,310	9,119	9,500
Advertising	27,358	31,741	33,000
Interest and dividends	701	1,001	1,200
Miscellaneous income	4,609	2,899	3,000
	$136,109	$147,225	$153,400

EXPENSE

JOURNAL OF FORESTRY	$ 42,179	$ 48,573[1]	$ 45,500
Editor's expense	615	311	1,200
Salaries, editoral	11,042	11,212	11,750
Salary, exec. Sec. & staff asst.	10,000	10,375	16,500
Salaries, office	26,451	31,652	32,620
Advertising commission	8,792	9,658	10,000
Adv. promotion and expense	3,055	4,134	4,000
Travel, officers	3,364	3,384	4,000
Postage	2,688	2,185	3,000
Telephone and telegraph	710	719	800
Rent	6,318	6,318	7,278
Mimeograph and multigraph	633	560	700
Miscellaneous printing	1,106	1,294	1,400
Office supplies	962	1,551	1,600
General expense	904	1,275	1,100
Depreciation	1,443	1,559	1,500
Retirement plan	1,528	1,486	1,480
Retirement plan reserve	585	633	——
Affiliation dues	110	160	160
Committee expense	82	190	100
Division expense	40	83	100
Grading forestry schools	415	313	500
Council travel	1,264	1,652	1,500
Social security tax	790	889	1,185
Election of officers and Fellows	801	——	1,000
Forest Service dinner	100	——	——
Proceedings	530	——	——
Maintenance of equipment	473	439	600
National Research Council	100	——	——
Miscellaneous	3	38	200
	$127,083	$140,643	$149,773
Net earnings	$ 9,026	$ 6,582	$ 3,627

[1]Including membership directory.

Coming Events

North American Wildlife Conference

The 22nd North American Wildlife Conference will be held March 4-6 in the Statler Hotel, Washington, D. C.

New England Section

The New England Section will meet March 6-7 at the Somerset House, Boston, Mass.

Wisconsin-Michigan Section

The annual meeting of the Wisconsin-Michigan Section will be held at the Dickinson Hotel, Iron Mountain, Mich., March 15-16.

Sixth Annual Forestry Symposium

The Sixth Annual Forestry Symposium will be held on the campus of Louisiana State University, Baton Rouge, April 4-5. Registration and housing information available from: Director, General Extension Div., Louisiana State University, Baton Rouge.

Gulf States Section

The Gulf States Section will hold its 1957 meeting at the Jung Hotel, New Orleans, La. on May 9-10.

Penn State 50th Anniversary

The 50th anniversary of forestry education in Pennsylvania will be celebrated at the University, University Park, May 27-28.

Forest Products Research Society

The Forest Products Research Society will hold its national annual meeting June 24-27 in Buffalo, N. Y.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society office during the month of January are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of April 1, 1957. Communications from voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

WEST VIRGINIA UNIVERSITY

Litten, C. C.

Junior Grade

Cegelka, V. S., Senior Forester, Pa. Dept. of Forests & Waters, Blain, Pa.; Pa. State, B.S.F., 1955.

Colwell, H. E., Forester, Pa. Dept. of Forests & Waters, Williamsport, Pa.; Pa. State, B.S.F., 1950.

Member Grade

Ayre, W. L., 2976 Wilson Parkway, Harrisburg, Pa. (Junior 37R56).

Beatty, E. W., Forester, Pa. Dept. of Forests & Waters, Ligonier, Pa. (Junior 36R55).

Bedger, R. C., R. D. 1, Johnsonburg, Pa. (Junior 1950).

Drury, P. R., Monroe County, Reeders, Pa. (Junior 1950).

Gingrich, S. F., Instructor, Pa. State, University Park, Pa. (Junior 1950).

Jones, T. R., Dist. Forester, Pa. Dept. of Forests & Waters, Coudersport, Pa. (Junior 29R55).

Kennedy, F. X., 2110 Sheriden St., Williamsport, Pa. (Junior 1950).

Landon, P. E., Asst. Forester, Armstrong Forest Co., Johnsonburg, Pa.; Pa. State, B.S.F., 1951. (Junior 1951).

Lane, H. M., Quehanna, Pa. (Junior 1950).

Lyon, T. J., R. F. D. #2, Smithsburg, Md. (Junior 1950).

Mellinger, R. H., Woodland Conservationist, Soil Cons. Service, Elizabeth, W. Va. Reinstatement.

Merrell, J. O., 505 N. Arch St., Montoursville, Pa. (Junior 1950).

Powell, G. E., Forester, E. S. Adkins Co., Salisbury, Md. (Junior 1950).

Rex, J. C., 47 Center Dr., Camp Hill, Pa. (Junior 46R55).

Robertson, G. K., Asst. Dist. Forester, Pocomoke State Forest, Pocomoke City, Md. (Junior 1950).

Williams, G. H., 12 Hersh Ave., Westminster, Md. (Junior 1950).

Appalachian Section

Junior Grade

Calderon, D. S., 130 Hawthorne Rd., Raleigh, N. C.; N. C. State, B.S.F., 1957. (Student 1954).

Mann, J. M., Cons. Forester, W. Va. Pulp & Paper Co., Chester, S. C. Reinstatement.

Neal, J. E., Area Forester, W. Va. Pulp & Paper Co., Anderson, S. C.; Mich. State, B.S.F., 1955.

Poplin, J. M., Forest Supv., Union Bag-Camp Paper Corp., Franklin, Va.; N. C. State, B.S.F., 1950.

Stuphin, L. I., Park Ranger, Philpott Dam & Reservoir, Bassett, Va.; V. P. I., B.S., (Forestry), 1952. (Affiliate 1953).

Member Grade

Aulback, J. J., Professor, V. P. I., Blacksburg, Va. (Junior 48R55).

Conger, S. H., Box 428, Weldon, N. C. (Junior 1949).

Dunn, R. L., Service Forester, Va. Div. of Forestry, Woodstock, Va. (Junior 1950).

Edwards, A. C., York, S. C. (Junior 1950).

Frazier, J. R., Pulpwood Dealer, Newberry, S. C. (Junior 1950).

Glattfelder, C. F., Forester, Glatfelter Pulp Wood Co., Fredericksburg, Va. (Junior 1950).

Griffin, F., Forester, Champion Paper & Fibre Co., Winnsboro, S. C. (Junior 1950).

Haag, W. G., Service Forester, Va. Div. of Forestry, Farmville, Va. (Junior 1950).

Haislet, J. A., Forest Land Mgmt., Riegel Carolina Paper Corp., Clinton, N. C. (Junior 1950).

Harkin, D. A., Research Forester, W. Va. Pulp & Paper Co., Georgetown, S. C. (Junior 1950).

Hiner, J. M., Asst. Ranger, George Washington Natl. Forest, Buena Vista, Va. (Junior 1950).

Hudgens, T. A., Consulting Forester, Commercial Foresters, Inc., Flat Rock, N. C. (Junior 46R55).

Lester, E. J., Ranger, Jefferson Natl. Forest, New Castle, Va. (Junior 1950).

Malsberger, H. J., Forester, International Paper Co., Winnsboro, S. C. (Junior 1950).

McNair, J. W., Consulting Forester, Charlottesville, Va. (Junior 1950).

Mitchell, H. W., 3019 Hollowell Ave. S.W., Roanoke, Va. (Junior 41R51).

Munger, E. L., Box 72, South Boston, Va. (Junior 1950).

Ordel, A. W., Box 875, Monck's Corner, S. C. (Junior 1950).

Otterbach, P. J., Forest Statistician, International Paper Co., Georgetown, S. C. (Junior 1950).

Shavis, J. M., Service Forester, Va. Div. of Forestry, Charlottesville, Va. (Junior 1950).

Slade, S. M., Box 22, Edgefield, S. C. (Junior 1950).

Stanley, L. S., 36-B Glenhaven Apt., Greenwood, S. C. (Junior 1950).

Steirly, C. C., Waverly, Va. Reinstatement.

Todd, D. P., Box 2673, Myrtle Beach, S. C. (Junior 1950).

Wynne, O. T., Rt. 2, Box 590, Central, S. C. (Junior 1950).

Central Rocky Mountain Section

Student Grade

COLORADO A & M COLLEGE

Campbell, D. I. Krumm, E. H.
Hessel, D. L. Mathers, J. R.

Junior Grade

Case, R. M., Box 265, Kremmling, Colo. Reinstatement.

Central States Section

Student Grade

PURDUE UNIVERSITY

Petty, M. W.

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Member Grade

Youngren, H. L., Forester, Ohio Div. of Forestry, Friendship, Ohio; Purdue, B.S.F., 1953. (Junior 1953).

Affiliate Grade

Young, J. T., Forester, Ohio Dept. of Natural Resources, Chillicothe, Ohio; V.P.I., B.S., (Forestry-Wildlife Cons.), 1952.

Associate Grade

Dochinger, L. S., Forest Pathologist, U.S.F.S., Columbus, Ohio; Rutgers Univ., B.S., (Orn. Hort.), 1950; Cornell Univ., M.S., (Orn. Hort.), 1952; Rutgers Univ., Ph.D., (Plt. Path.), 1956.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Arndorfer, R. W. Wenger, W. D.
Holdgrafer, G. N.

Junior Grade

Campbell, J. G., Staff Forester, State of Oregon, Salem, Ore.; Iowa State, B.S.F., 1947.

Leitch, M., Forester, Bureau of Land Mgmt., Medford, Ore. Reinstatement.

Schoppert, G. A., Sr. Forester, State of Oregon, Salem, Ore.; Ore. State, B.S.F., 1950.

Smith, G. B., Forester, State of Oregon, Salem, Ore.; Ore. State, B.S.F., 1948.

Member Grade

Driscoll, T. J., Logging Eng., Eastern Ore. Logging Co., Kinzua, Ore.; Univ. of Wash., B.S.F., 1953. (Junior 1953).

Eubanks, W. B., Appraisal Specialist, Ore. State Tax Comm., Salem, Ore. (Junior 1950).

Ferguson, B. M., Forester, Weyerhauser Tbr. Co., Longview, Wash. (Junior 1950).

Fink, C. R., Forester, U. S. F. S., Lowell, Ore. (Junior 1950).

Hermes, H. G., Forester-Engineer, Bureau of Land Mgmt., Eugene, Ore. (Junior 1950).

Higinbotham, D. D., Forester, Weyerhauser Tbr. Co., Allegany, Ore. (Junior 1950).

Keil, H. H., 8629 S. W. 41st Ave., Portland, Ore. (Junior 1950).

Richardson, J. H., Forester, Bureau of Land Mgmt., Eugene, Ore. (Junior 1950).

Stickney, D. B., Public Relations Staff, U.S.F.S., Portland, Ore. (Junior 1950).

Storms, M., Staff Forester, Bureau of Land Mgmt., Medford, Ore. (Junior 1950).

Stratton, C. H., Sales Representative, Western Fire Equipment Co., Portland, Ore. (Junior 48R53).

Tkach, J., Staff Forester, Bureau of Land Mgmt., Coos Bay, Ore. (Junior 1950).

Wanek, J., Rehabilitation Asst., Ore. State Board of Forestry, Forest Grove, Ore.; Ore. State, B.S.F., 1951. (Junior 1951).

Wilcox, E. R., Forestry Consultant, 139 S. 7th St., Klamath Falls, Ore. (Junior 1950).

Wright, K. H., Research Forester, U. S. F. S., Portland, Ore. (Junior 1950).

Gulf States Section

Student Grade

LOUISIANA STATE UNIVERSITY

Sanders, R. W. Stout, C. W.
Smoke, T. D.

Member Grade

Avery, T. E., Research Forester, Southern Forest Expt. Sta., New Orleans, La. (Junior 1950).

Baggette, D. E., Field Asst., International Paper Co., Pearlington, Miss.; A. P. I., B.S.F., 1950. (Junior 1951).

Beal, J. F., Ranger, U. S. F. S., Bently, La., (Junior 1950).

Brandau, W. H., Ranger, U.S.F.S., Alexandria, La. (Junior 1950).

Burnham, H. M., Forester, U. S. F. S., Good Pine, La. (Junior 1950).

Brewton, L. L., Pulpwood dealer, Winnfield, La. (Junior (1950).

Burns, E. B., Dist. Forester, La. Forestry Comm., Oberlin, La. (Junior (1950).

Carter, R. T., Area Forester, Gaylord Container Corp., Bogalusa, La. (Junior 1950).

Cothren, V. M., Forester, Southern Pine Asso., New Orleans, La. (Junior 1950).

DeWitt, W. A., Forester, Olin Mathieson Chem. Corp., Many, La. (Junior 1950).

Dixon, M. J., Flood Control Forester, U.S.F.S., Batesville, Miss. (Junior 1950).

Donaldson, D. J., Forester, R. O. Masten Lbr. Co., Alexandria, La. (Junior 49R55).

Eberhardt, W. E., Area Forester, Gaylord Container Corp., Walker, La.; Univ. of Mich., B.S.F., 1952. (Junior 1952).

Estes, L. F., Chief, Div. of Forest Mgmt., Miss. State Forest Service, Jackson, Miss. (Junior 1950).

Fitzgerald, O. L., Asst. Prof., L. P. I., Ruston, La. (Junior 1950).

Freeman, E. A., Asst. Forest Mgr., Olin Mathieson Chem. Corp., West Monroe, La. (Junior 45R55).

Froula, J. C., Asst. Dist. Ranger, U. S. F. S., Lexington, Miss. (Junior 1950).

Garofalo, J. J., Field Asst., International Paper Co., Amite, La. (Junior 1950).

Gerred, D. L., Asst. Project Mgr., U. S. F. S., Oxford, Miss. (Junior 34R55).

Golden, E. A., Forester, Champion Paper & Fibre Co., Huntsville, Texas. (Junior 1950).

Griffin, B. F., Consulting Forester, P. O. Box 242, Hammond, La. (Junior 1950).

Harrington, T. A., Asst. Ranger, U. S. F. S., Forest, Miss. (Junior 1950).

Hodge, J. S., Dist. Forester, International Paper Co., Colfax, La. (Junior 1950).

Holcombe, E. D., Conservation Forester, Soil Cons. Service, Alexandria, La. (Junior 1950).

Hughes, J. D., Dist. Forester, Gaylord Container Corp., Poplarville, Miss. (Junior 1950).

Hulett, A. D., Dist. Forester, Lahih Lbr. Co., Long Leaf, La. (Junior 1950).

Hunz, R. H., Forester, U. S. F. S., Ashland, Miss.; Univ. of Mo., B.S.F., 1952. (Junior 1952).

Keister, T. D., Area Forester, Gaylord Container Corp., Livingston, La. (Junior 1950).

Knouse, H., District Forester, Champion Paper & Fibre Co., Livingston, Texas; La. State, B.S.F., 1949. (Junior 1951).
Kutack, J. N., Cons. Forester, International Paper Co., Natchez, Miss. (Junior 1950).
Lathrop, F. P., Cons. Forester, Weyanoke, La. (Junior 39R55).
Loeffler, J. R., Forester, Crosley Chemical Co., Picayune, Miss. (Junior 1950).
Miles, D. J., Pole Inspector, Western Electric Co., Picayune, Miss. (Junior 49R55).
Mitchell, R. E., Chief Forester, Hillyer-Deutsch-Edwards Lbr. Co., Oakdale, La. (Junior 1950).
Mustian, A. P., Dist. Ranger, U. S. F. S., Lufkin, Texas. (Junior 1950).
Read, J. W., Dist. Forester, Olin Mathieson Chem. Corp., Winnfield, La. (Junior 1950).
Robertson, R. R., Asst. Ext. Forester, Miss. State, State College, Miss. (Junior 1950).
Roundtree, L. J., Asst. Forester, Olin Mathieson Chemical Corp., Zwolle, La. (Junior 1950).
Seale, J. W., Forester, Crosby Chemical Corp., Picayune, Miss. (Junior 1950).
Shoulders, E., Research Forester, U. S. F. S., Alexandria, La. (Junior 1950).
Smith, A. B., Forester, Olin Mathieson Chem. Corp., West Monroe, La. (Junior 1950).
Starr, J. W., Asst. Prof., Miss. State, State College, Miss. (Junior 1950).
Strong, O. B., Asst. Wood Proc. Forester, International Paper Co., Amite, La. (Junior 1950).
Taylor, N. W., Ranger, U.S.F.S., Raleigh, Miss. (Junior 1950).
Ursic, S. J., Research Forester, U. S. F. S., Oxford, Miss. (Junior 1950).
Vallentine, W. C., Chief Fire Control, La. Forestry Comm., Baton Rouge, La. (Junior 47R53).
White, J. B., Consulting Forester, Hattiesburg, Miss. (Junior 1950).
White, L. C., Forester, Chicago Mill & Lbr. Co., Tallulah, La. (Junior 1950).
Woody, A. D., Asst. Ranger, U. S. F. S., Forest, Miss. (Junior 1950).

Intermountain Section

Student Grade

UTAH STATE AGRICULTURAL COLLEGE

Cahill, H. B. Williams, G. C.

Kentucky-Tennessee Section

Member Grade

Kettenbeil, D. H., Asst. Dist. Forester, Hiwassee Land Co., Etowah, Tenn.; Univ. of Mich., B.S.F., 1953. (Junior 1953).

New England Section

Student Grade

YALE UNIVERSITY

Crouse, R. P.

Member Grade

Morrill, G. W., Rt. 3, Concord, N. H. (Junior 35R50).
Neff, A. W., Reeds Ferry, N. H. (Junior 1949).
Pike, J. B., Blister Rust Control, U. S. F. S., Bridgton, Maine. Reinstatement.
Poppema, D. R., Consulting Forester, New England Forestry Foundation, Center Barnstead, N. H.; Mich. State, B.S.F., 1950; M.S., 1951. (Junior 1951).

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Farrenkopf, T. O. Nesbitt, J. R.
Henninger, D. E. Wolf, R. F.

Nardi, A. P.

Member Grade

Barrus, G. L., Consulting Forester, Rochester, N. Y. (Junior 28R55).
Bell, R. J., Timber Appraiser & Consulting Forester, Norwich, N. Y. (Junior 1950).
Brown, O. W., Forester, N. Y. State Cons. Dept., Boonville, N. Y. (Junior 1950).
Harrison, D. B., Export Mgr., Osmoss Wood Preserving Co., Buffalo, N. Y. (Junior 1949).
Hopkins, B. W., Work Unit Conservationist, Soil Cons. Service, Morrisonville, N. Y. (Junior 1950).
Horn, A. F., Graduate Student, State Univ. of N. Y., Syracuse, N. Y. (Junior 1950).
Madison, H., Dist. Ranger, N. Y. State Cons. Dept., Falconer, N. Y. (Junior 48R55).
Oettinger, F. W., Forester, N. Y. State Cons. Dept., Hyde Park, N. Y. (Junior 1950).
Statler, E. E., Lbr. & Tbr. Buyer, Atlantic Lbr. Co., Kenmore, N. Y. (Junior 1950).

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Becker, S. L., Research Asst., Bristol Labs., Inc., Syracuse, N. Y.; State Univ. of N. Y., B.S., (Wood Tech.), 1953.

Widger, H. J., Mgr. of Prod. Planning, Oswego Falls Corp., Fulton, N. Y.; State Univ. of N. Y., B.S., (Wood Tech.), 1940.

Northern California Section

Junior Grade

Foster, H. B., 479 Kentucky Ave., Berkeley, Calif.; Univ. of Calif., B.S.F., 1956 (Student 1956).

Northern Rocky Mountain Section

Student Grade

MONTANA STATE UNIVERSITY

Flohr, D. L. Laber, A. W.
Jukkala, A. H.

Member Grade

Slusher, E. C., Dist. Ranger, U.S.F.S., West Yellowstone, Mont.; Univ. of Idaho, B.S.F., 1942. (Junior 1951).

Affiliate Grade

Isaacs, O. O., Asst. State Forester, Mont. State Forestry Dept., Missoula, Mont.

Ozark Section

Member Grade

Armstrong, H. G., Asst. Dist. Ranger, U. S. F. S., Mt. Ida, Ark.; Mich. State, B.S.F., 1953. (Junior 1953).

Junior Grade

Range, J. E., Dist. Forester, Mo. Cons. Comm., Neosho, Mo. Reinstatement.

Puget Sound Section

Student Grade

UNIVERSITY OF WASHINGTON

Skoglund, A. S. Wilson, B. C.

Junior Grade

Wilbur, D. W., Forest Inventory Asst., Weyerhaeuser Tbr. Co., Tacoma, Wash. Reinstatement.

Member Grade

Haack, P. M., Forester, U.S.F.S., Juneau, Alaska; Univ. of Minn., B.S.F., 1949. (Junior 1952).

Wiley, K. N., Research Forester, Weyerhaeuser Tbr. Co., Centralia, Wash.; Colo. A & M., M.F., 1950. (Junior 1953).

Affiliate Grade

Murray, C. E., Research, Rayonier, Inc., Shelton, Wash.; State Univ. of N. Y., B.S., (Wood Tech.), 1948.

Robinson, E. D., Assoc. Forester, Simpson Logging Co., Shelton, Wash.; Mich. College of Mining & Tech., B.S., (Forest Mgmt.), 1953.

Tovey, W. B., Asst. Forester, Weyerhaeuser Tbr. Co., Snoqualmie Falls, Wash.

Associate Grade

Brown, S. H., Mgr. of Public Educ. & Recreation, Weyerhaeuser Tbr. Co., Tacoma, Wash.; Univ. of Pa., B.A., (Arts & Science), 1939.

Southeastern Section

Student Grade

UNIVERSITY OF FLORIDA

Parsons, H. T.

UNIVERSITY OF GEORGIA

Millians, W. D. Panter, J. H.

Junior Grade

Hoekstra, P. E., Research Forester, Southeastern Forest Expt. Sta., Lake City, Fla.; Iowa State, B.S.F., 1951; N. C. State, M.S., 1955.

Pennington, R. E., Forester, U. S. F. S., Lake City, Fla.; Univ. of Minn., B.S.F., 1955.

Smith, F. A., Forester, Ga. Forestry Comm., Statesboro, Ga. Reinstatement.

Venema, W., Wood Procurement, Ga. Kraft Co., Macon, Ga. Reinstatement.

Wynn, G. F., P. O. Box 43, Warner Robins, Ga. Reinstatement.

Member Grade

Barber, T. F., Asst. Fire Control Chief, Ga. Forestry Comm., Macon, Ga. (Junior 1950).

Barnes, C. S., 480 Forest Ave., Macon, Ga. (Junior 1950).

Barnes, W. R., Asst. Dist. Forester, Ga. Forestry Comm., Milledgeville, Ga. (Junior 1950).

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Batson, J. O., Vice President, Allison Lbr. Co., Bellamy, Ala. (Junior 1950).

Binns, W. A., Farm Forester, Ga. Forestry Comm., Milledgeville, Ga. (Junior 1950).

Blackerby, J. H., Forest Supv., Union Bag-Camp Paper Corp., Savannah, Ga. (Junior 34R56).

Boyd, E. F., Soil Cons., Soil Cons. Service, Swainsboro, Ga. (Junior 34R55).

Chapman, W. L., Woodlands Div., Coosa River Newsprint Co., Childersburg, Ala. (Junior 1950).

Cole, D. E., Forester, Gair Woodlands Corp., Savannah, Ga. (Junior 1950).

Coleman, D. E., Self employed, Turpentine business, Valdosta, Ga. (Junior 1949).

Collier, H. G., Forester, Ga., Forestry Comm., Washington, Ga. (Junior 1950).

Cox, G. T., Forester, Rayonier Corp., Jesup, Ga. (Junior 1950).

Cumbie, J. D., Forester, Union-Camp Mfg. Co., Waycross, Ga. (Junior 1950).

Darley, H. W., Forester, Ga. Forestry Comm., Macon, Ga. (Junior 1950).

Davis, S. A., Forester, St. Regis Paper Co., Gainesville, Fla. (Junior 1950).

Douglass, O. R., P. O. Box 701, Fernandina, Fla. (Junior 41R52).

Hall, J. M., Consulting Forester, Moultrie, Ga. (Junior 48R53).

Hankinson, T. B., Asst. to State Forest Mgmt. Dir., Ga. Forestry Comm., Milledgeville, Ga. (Junior 1950).

Hardee, J. L., Forester, Buckeye Cellulose Co., Trenton, Fla. (Junior 1950).

Harrison, R. P., Research Forester, U. S. F. S., Macon, Ga. (Junior 1950).

Horney, H. E., Forester, Macon Kraft Co., Eufaula, Ala. (Junior 1950).

Johnston, J. G., Asst. Forester, Woodward Iron Co., Birmingham, Ala. (Junior 1950).

Knight, V. J., Woodlands Div., Coosa River Newsprint Co., Coosa Pines, Ala. (Junior 1950).

Lacher, T. V., Tbr. Mgmt. Asst., U. S. F. S., Haleyville, Ala. (Junior 1950).

Lewis, W. I., Forester, Union-Camp Mfg. Co., Thomasville, Ga. (Junior 1950).

Marshall, T. W., Cons. Forester, Gulf States Paper Corp., Centreville, Ala. (Junior 1950).

McCarty, W. H., Self Employed, Pulpwood Dealer, White Oak, Ga. (Junior 1949).

Miller, J. E., Chief Forester, U. S. Pipe & Foundry Co., Birmingham, Ala. (Junior 1950).

Moore, J. B., Forester, Union-Camp Mfg. Co., Folkston, Ga. (Junior 1950).

Neel, W. L., Forester, Sherwood Plantation, Thomasville, Ga. (Junior 1950).

Nickens, R., 307 E. 48th St., Savannah, Ga. (Junior 1950).

Orwig, H. L., Supv. of Nursery & Planting, Atlantic Land & Improvement Co., LaBelle, Fla. (Junior 1950).

Parnell, C. W., Hercules Powder Co., Folkston, Ga. (Junior 1950).

Rankin, G. S., Forester, Macon Kraft Co., Macon, Ga. (Junior 1950).

Reid, J., Forester, Ga. Forestry Comm., McRae, Ga. (Junior 1950).

Sandretto, R. P., Field Representative, Union Bag-Camp Paper Corp., Cordele, Ga. (Junior 1950).

Scott, T. R., Forester, Pomeroy & McGowin, Mobile, Ala. (Junior 1950).

Scudder, K., Forester, St. Regis Paper Co., Jacksonville Beach, Fla. (Junior 49R55).

Shelton, L. P., Forester, Natl. Container Corp., Valdosta, Ga. (Junior 1948).

Sheppard, M. H., Forester, Hercules Powder Co., Starke, Fla. (Junior 1950).

Snedaker, R. A., Conservation Forester, Rayonier, Inc., Fernandina Beach, Fla. (Junior 1950).

Stewart, F. M., Forester, Ala. Power Co., Vredenburgh, Ala. (Junior 1950).

Thacker, S. W., Forester, Ga. Forestry Comm., Atlanta, Ga. (Junior 1950).

Thigpen, V. G., Forester, Union-Camp Mfg. Co., Homerville, Ga. (Junior 1950).

Tift, R. H., Forester, Union Bag-Camp Paper Co., Savannah, Ga. (Junior 1950).

Vande Linde, F., Forester, Brunswick Pulp & Paper Co., Brunswick, Ga. (Junior 1950).

Yow, V., Instructor, Abraham Baldwin Agric. College, Tifton, Ga. (Junior 1950).

Affiliate Grade

Quitta, J. T., Asst. Area Forester, Gair Woodlands Corp., Swainsboro, Ga.; Stephen F. Austin State College, B.S., (Forestry), 1954.

Southern California Section

Member Grade

Doner, M. H., Forester, Big Bear Lbr. Co., San Bernardino, Calif. (Junior 1950).

Paldi, J. W., Dist. Ranger, U.S.F.S., Kernville, Calif. (Junior 1950).

Roget, E. L., Soil Cons. Service, El Centro, Calif. (Junior 1950).

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Trygar, R. W., Asst. Ranger, U.S.F.S., Glendora, Calif. (Junior 1950).
Walter, C. H., Assoc. Ranger, Calif. Div. of Forestry, San Diego, Calif. (Junior 1950).

Southwestern Section

Member Grade

Bennett, R. K., Forester, Heber Ranger Sta., Overgaard, Ariz. (Junior 48R55).
Carey, R. E., Forester, Penasco Ranger Sta., Penasco, N. Mex. (Junior 1950).
Fleishman, W. J., 2 Ridgecrest Dr., Flagstaff, Ariz. (Junior 1950).
Hawksworth, F., Forest Insect & Disease Lab., Albuquerque, N. Mex. (Junior 1950).
Lewis, H. G., Coronado Natl. Forest, Tuscon, Arizona. (Junior 1949).
Lupsha, J. M., Service Forester, Maine Forest Service, Island Falls, Maine. (Junior 1950).
Palmer, A. N., Dist. Ranger, U. S. F. S., Ruidoso, N. Mex. (Junior 1950).
Pfefferle, K. T., Dist. Forest Ranger, U.S.F.S., Young, Ariz. (Junior 1950).
Pickett, G. S., Dist. Ranger, U. S. F. S., Reserve, N. Mex. (Junior 1950).
Reynolds, R., Dist. Ranger, U. S. F. S., Elgin, Ariz.; Mich. State, B.S.F., 1936. (Junior 1953).
Voyles, R. L., Box FF, Magdalena, N. Mex. (Junior 1950).
Weeden, N. P., 4020 Mescalero Rd. N. E., Albuquerque, N. Mex. (Junior 49R53).
Weissenborn, K. R., Luna Ranger Sta., Luna, N. Mex. (Junior 1950).
Whipple, E. L., Forester, U.S.F.S., Taos, N. Mex. (Junior 1950).

Upper-Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Clausen, M. D. Perkins, J. B.
Goad, J. A. Pipho, H. L.
Miles, R. L.

UNIVERSITY OF MINNESOTA

Berkeris, G. G. King, J. W.
Bernd, C. K. Toutges, R. J.
Chisholm, D. K.

Junior Grade

DeVaul, F. D., Rolfe, Iowa; Iowa State, B.S.F., 1956. (Student 1955).
East, C. H., 610 E. 22nd St., Hibbing, Minn. Reinstatement.
Ecker, E. F., 1428 N. Hampshire Place, Mason City, Iowa; Iowa State, B.S.F., 1956. (Student 1955).

Member Grade

Allyn, A. D., Farm Forester, Iowa Cons. Comm., Fairfield, Iowa. (Junior 47-R52).
Dorn, D. E., Ranger, U.S.F.S., Isabella, Minn. (Junior 1950).
Ingram, D. O., Forester, Consolidated Paper Co., Little Marias, Minn. (Junior 1950).
Johnson, A. W., Project Forester, Soil Cons. Service, Chariton, Iowa. (Junior 1950).
Langenbach, C. A., Chief Forester, Crandon Enterprises, Fort Madison, Iowa. (Junior 1950).
Lee, R. E., Dist. Forester, Kimberly-Clark of Minn., Duluth, Minn. (Junior 1950).
Roberts, F. J., Watershed Forester, Cavalier, N. Dak. (Junior 1950).

Affiliate Grade

Parshall, G. C., Asst. Supv., Minn. Div. of Forestry, Park Rapids, Minn.

Washington Section

Junior Grade

Rapp, D. A., Jr. Mgmt. Asst., U. S. D. I., Washington, D. C.; Univ. of Minn., B.S.F., 1952.

Associate Grade

Haeskaylo, E., Plant Physiologist, U.S. D.A., Beltsville, Md.; Geo. Wash. Univ., A.B., (Botany), 1949; M.A., (Botany), 1950; Ph.D. (Botany), 1954.

Wisconsin-Michigan Section

Student Grade

UNIVERSITY OF MICHIGAN

Davidson, F. R. Hedrich, D. R.
Foster, R. L. Olsen, J. M.

Member Grade

Auble, R. G., Regional Forester, Mich. Dept. of Cons., Roscommon, Mich. (Junior 1950).
Baltus, J. R., Dist. Forester, Wis. Cons. Dept., Wausau, Wis. (Junior 49R55).
Blomquist, T. W., Dist. Forester, Wis. Cons. Dept., Wautoma, Wis. (Junior 1950).
Burke, R. E., Forester, Marathon Corp., Pence, Wis. (Junior 1950).
Cook, R. W., Dist. Forester, Wis. Cons. Dept., Oconto, Wis. (Junior 1950).
Costley, R. J., Chief of Div. Education & Info., U. S. D. A., Milwaukee, Wis. (Junior 1950).

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DeVriend, A., Area Supv., Wis. Cons. Dept., Oshkosh, Wis. (Junior 1950).
Engelhard, R. J., Forester, Trees for Tomorrow, Merrill, Wis. (Junior 1950).
Freeland, F. D., Staff Member, Mich. State, East Lansing, Mich. (Junior 1949).
Gunderson, W. R., Forester, Thureson Lbr. Co., Howell, Mich. (Junior 1950).
Holt, G. G., Dist. Forester, Wis. Cons. Dept., Sheboygan, Wis. (Junior 1950).
Jordan, W. R., Dist. Forester, Wis. Cons. Dept., Madison, Wis. (Junior 1950).
Jungbacker, J. P., Partner, Johns Lbr. Co., Milwaukee, Wis. (Junior 1950).
Leaf, A. L., Research Asst., Univ. of Wis., Madison, Wis. (Junior 1950).
Livens, W. H., Forester, U.S.F.S., Cadillac, Mich. (Junior 1949).
Nagle, D. E., City Forester, Pontiac, Mich. (Junior 1950).
Nielsen, M. C., Land Appraiser, Mich. State Highway Dept., Lansing, Mich. (Junior 1950).
Oilschlager, E., Nurseryman, Nekoosa-Edwards Paper Co., Port Edwards, Wis. (Junior 1950).
Petry, R. A., Asst. Woodlands Mgr., Nekoosa-Edwards Paper Co., Port Edwards, Wis. (Junior 1950).
Rasmussen, R. M., Dist. Forester, Mich. Dept. of Cons., Gaylord, Mich. (Junior 1950).
Richards, D. L., Park Mgr., Lakeport State Park, Port Huron, Mich. (Junior 1950).
Rude, W. B., Staff Forester, S. D. Warren Co., Muskegon, Mich. (Junior 1950).
Schenk, J. A., Research Asst., Univ. of Wis., Madison, Wis. (Junior 1950).
Sedlacek, A. G., Land Acquisition, Green Bay Pulp & Paper Co., Green Bay, Wis. (Junior 1950).
Smith, D. M., Forest Products Technologist, U. S. Forest Products Lab., Madison, Wis. (Junior 1950).
Stevens, L. A., Dist. Forester, Mich. Cons. Dept., l'Anse, Mich. (Junior 1950).
Stewart, R. B., Forest Entomologist, Wis. Cons. Dept., Wisconsin Rapids, Wis. (Junior 1950).
Thorne, H. W., Forester, Wis. Cons. Dept., Madison, Wis. (Junior 1950).
Thornton, P. L., Research Forester, Lake States Forest Expt. Sta., Marquette, Mich. (Junior 1950)
Underwood, N. B., Forest Entomologist, Wis. Cons. Dept., Wisconsin Rapids, Wis. (Junior 1950).
Washburn, R. D., Consulting Forester, Marquette, Mich. (Junior 1950).
Youngblood, E. F., Dist. Ranger, U.S.F.S., Manistique, Mich. (Junior 1950).

Affiliate Grade

Schure, W. C., Dist. Woods Supt., Ontario Paper Co., Kirkland Lake, Ont., Canada; Univ. of New Brunswick, B.S., (Forestry), 1953.
Swanson, R. G., Area Supv., Consolidated Water Power & Paper Co., Ashland, Wis.; Mich. College of Mining & Tech., B.S., (Forestry), 1942.

Foreign

Member Grade

Davila-Olivo, G., Professor, Univ. de Los Andes, Merida, Venezuela; Univ. of Mich., B.S.F., 1951. (Junior 1951).

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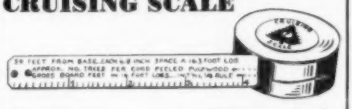

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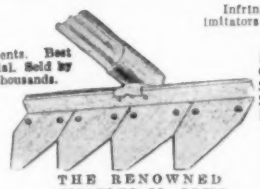

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men work with nature to keep tree-growing lands productive...

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The key to a perpetual supply of wood for America lies in man's ability to manage commercial forestlands for maximum productivity. To attain this end, industrial foresters skilled in the art of silviculture are working to grow crop after crop of trees in endless cycles. Applying principles of good forestry, they also provide for the wise use and perpetuation of other forest resources on their lands.

Weyerhaeuser Timber Company forestlands are scientifically managed by trained graduate foresters who supervise harvesting, growing, protecting and reforesting activities. They are supported by others who are engaged in a continuing program of both applied forestry research and long-range planning. Together, these men are the nucleus of a forest management team dedicated to the objective of keeping *all* of our timberlands productive...supplying wood and other forest benefits, forever.

The private forest industry in the United States now employs about 60 per cent of all graduate foresters. Many supervise the 41 million acres of tax-paying timberlands operated as certified tree farms. *Write us, Box A, Tacoma, Washington for a booklet on tree farming,* ***Promise of the Trees.***

Weyerhaeuser Timber Company

No. 29 of a series featuring forestry practices, projects and products.

New Jersey

New Jersey, in spite of important agriculture, encroaching industry and increasing urbanization, still retains nearly one-half its area—2,000,000 acres—in forest land.

The northern mountainous areas support miles of unbroken forests on slopes and ridge tops. In the river valleys, woodlots produce excellent stands of white oak, yellow poplar and other hardwoods. The "Pine Barrens", in the southeastern corner of the state, contain more than 1,200,000 acres, or nearly 2,000 square miles of virtually unbroken forest.

New Jersey's conservation program developed gradually over the last 50 years, until very recently. During the past 3 years, public land holdings, under the jurisdiction of the Forestry Bureau, have more than doubled to reach about 175,000 acres. Simultaneously forests and parks are undergoing extensive improvement and development as a result of demand for public recreation and legislative appropriations for capital improvements.

In the field of forest management, experimentation has developed controlled burning techniques which, when applied during the winter months, provide ideal seedbed conditions for the regeneration of pine. Controlled burning is an established policy of this department in its cooperative assistance with private woodland owners. This modern forestry technique, in addition to its silvicultural value, also reduces the fuel on the ground that would feed wild fires. The last decade has brought an increasing demand by manufacturers of roofing materials for pine pulpwood within trucking distance of the plants. It is indicated that controlled burning can increase pulpwood production at least six-fold in the Pine Barrens.

Fire protection over the years has been a serious problem, particularly in this region. Aided by modern equipment, better organization, radio and airplane, New Jersey already boasts an improved record with further progress forseeable in the field of public recreation forest management and fire control.

NEW JERSEY DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT—*contribution to this series does not necessarily constitute endorsement of Southern Glo products.*

Wherever modern forest management is practiced, foresters find Southern Glo tree-marking paints a convenient tool. Of the three types—ready-mixed paint, paint paste and boundary paint—the latter is often the choice for experimental and specialized marking techniques. Far from the least expensive in initial cost, the performance of boundary paint nonetheless often effects long-run economy. Its highly visible mark lasts for years, resists almost any destructive force except fire and continued flooding. Based on the same stay-mixed formula #71020 of all Southern Glo paints, it requires little or no mixing before use, eliminates waste from settling. If you have a marking problem, why not try Southern Glo boundary paint?—It comes in 6 standard colors including aluminum—ready for brush application, or for thinning to spray consistency.

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Forestry News

Governor of Alaska Resigns, Lauded by President

President Eisenhower accepted December 18 the resignation of B. Frank Heintzleman as Governor of Alaska, effective Jan. 3.

The White House made public a copy of a letter in which the President told Mr Heintzleman that he had contributed significantly to the development of the territory during his term as governor.

"I extend to you my sincere appreciation for a job well done," the President wrote.

Mr. Eisenhower spoke particularly of the Governor's efforts to develop natural resources of Alaska and in establishing a pulp industry in the territory.

In his letter of resignation to Mr. Eisenhower, Heintzleman said he did not wish another term as Governor, "as I have now had 46 years of public service and desire to retire to less strenuous work."

His term runs to April 10 but he said he thought his successor should take over before the territorial legislative session beginning Jan. 28.

Mr. Heintzleman is a Fellow of the SAF.

Pack Foundation to Undertake Watershed Program

The Charles Lathrop Pack Forestry Foundation, with headquarters in New York and Washington, D. C., is undertaking a program in interpretive education and research in forest and watershed conservation in New Mexico, Arizona, and adjacent states, according to an announcement made by Arthur Newton Pack.

William H. Carr, who is the founder of the Arizona-Sonora Desert Museum at Tucson, and formerly associate curator of public education of the American Museum of Natural History of New York, has been chosen to be director of the educational phase of the forest and watershed conservation program with headquarters in Tucson.

Clarence L. Forsling, of Albuquerque, N. Mex., one of the pioneers of watershed research in the United States, will be the director of the research phase of the program, with headquarters in Albuquerque.

Mr. Pack pointed out that the decision of the officials of the Charles Lathrop Forestry Foundation to devote a considerable part of its resources to dealing with watershed problems grew out of the acuteness of the water supply situation in the Southwest Region. He called attention to the need for a better understanding on the part of the public and land managers of the conditions of forest and other plant cover that will promote the most favorable results in the long run as regards yield of usable water and other products and uses of watershed lands.

Leffler Named Assistant Secretary For Fish and Wildlife

Ross L. Leffler, former executive of the United States Steel Corp. and for many years a prominent Pennsylvania conservationist, was named in January by President Eisenhower to fill the post of Assistant Secretary of the Interior for Fish and Wildlife. The appointment was subject to later Senate confirmation. This is a new post in the Department created by the reorganization act of 1956 which set up the Bureau of Sport Fisheries and Wildlife and the Bureau of Commercial Fisheries within the Fish and Wildlife Service. Appointment of a Commissioner of the Service, also a new post, was expected within a short time.

Mr. Leffler was a member of the Pennsylvania Game Commission for 29 years, 16 of them as its president. He has been active in various citizen's conservation groups and the Boy Scouts of America and is a past president of the International Association of Game, Fish and Conservation Commissioners.

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Richard G. Kimbell Appointed NLMA Executive Vice President

Richard G. Kimbell has been appointed acting executive vice president of the National Lumber Manufacturers Association, Washington, D. C.

Kimbell, NLMA vice president of technical services since 1954 and a veteran of 38 years with the association, acts in place of Leo V. Bodine, who resigned recently to accept the position of vice president with the Diamond Match Company.

A native of Livingston County, Ill., Kimbell is the author of publications on wood utilization, timber engineering, and structural design. Several of these works are used as basic texts in colleges and universities.

Public

New Hampshire Commission Denies Interference of County Foresters in Private Industry

The New Hampshire Forestry and Recreation Commission on January 14 denied charges by Walter L. Koenig of Concord, chief forester of New England Forest Industries, Inc., that county foresters were interfering with private industry.

Harry K. Rogers of Suncook, chairman of the Commission, said after an informal hearing at which Koenig appeared, that his allegations had been investigated and that the Commission could "find no reasonable basis" for them.

Koenig, a private consulting forester for seven years, accused New Hampshire's county extension foresters of harming the state's forest economy by allegedly interfering with private industry and specifically referred to Theodore Breon, Carroll County forester.

Koenig's charges were contained in a letter to Kenneth E. Barraclough, extension forester at the University of New Hampshire, and in similar correspondence to Secretary of Agriculture Ezra Benson in Washington, D.C.

Rogers said the investigation, conducted with the assistance of the University of New Hampshire Extension Division, uncovered "no reasonable basis" for any of the charges against the county forestry program and Breon in particular.

Forest Fire Problem Analysis Made in Georgia

Kenneth P. Davis, chairman of the Department of Forestry, School of Natural Resources, University of Michigan, completed in mid-November a 2-month study of forest fire problems and research needs in Georgia. The work was requested and financed by the Georgia Forestry Commission and done in cooperation with the Southeastern Forest Experiment Station through whom Dr. Davis was employed.

The work has resulted in two reports. An illustrated booklet, "Forest Fire in Georgia—Problems and Research Needs," was printed by the Commission for general distribution giving a summary of the study and findings in brief. A more detailed problem analysis "Forest Fire Control Problems and Research Needs in Georgia" is being duplicated. The reports are distributed by the Georgia Forestry Commission and the Southeastern Station.

Following the Georgia assignment, Dr. Davis returned to Missoula, Mont., to complete his first semester of sab-

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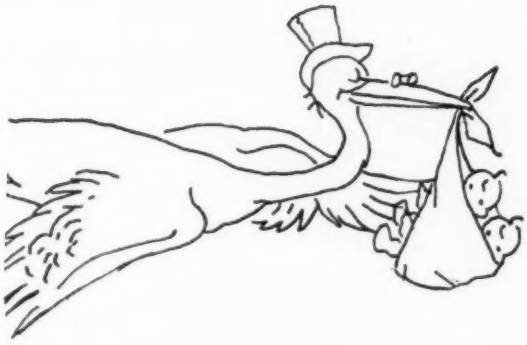

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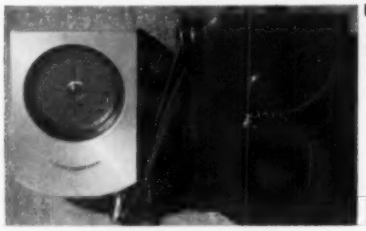

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Scale is subdivided 0 to 360 degrees and can be read accurately to 10 angle *minutes;* liquid filled needle container: quick settling needle.

To operate, turn compass so that the hair line, when viewed through the lens, points to the object, the compass bearing of which is desired. By optical illusion, the hair line appears to rise above the frame surface and is easily seen. Simultaneously the direction is indicated on the compass scale immediately behind the hairline. Direct reading, direct sighting. Most accurate. Table of cotangents on compass back.

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For elevation or slope, sight hair line at object, viewing object with left eye and hairline with right eye simultaneously. This produces super-imposed image of object, hairline and scale. Can be used as hand level or hypsometer. In close places angle can be read directly through side window. Clinometer backside presents table of decimals of angle cosines. REPLACE YOUR ABNEY HAND LEVEL NOW, with a lighter, more compact and accurate instrument AT LESS COST.

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batical leave and continue manuscript work on a forthcoming book "Forest Fire: Control and Use." In Missoula, Davis is being furnished office space and cooperative assistance by the U. S. Forest Service, both the Intermountain Experiment Station and Region One.

Goddard Honored by Pa. Forestry Association

Maurice K. Goddard, secretary of Pennsylvania's Department of Forests and Waters, has been presented the 1956 Pennsylvania Forestry Association Conservation Award in recognition of "long and sustained work in the field of conservation."

The award was made at a recent meeting of the association at which Lloyd E. Partain of the Curtis Publishing Co., Philadelphia, was re-elected president.

Mr. Goddard is on leave of absence as director of the School of Forestry, Pennsylvania State University. He is a member of the Council of the SAF.

Association of Senior Engineers Honors John G. Kuenzel

The Association of Senior Engineers of the Bureau of Ships, in its awards and citations for 1956, presented a citation to John G. Kuenzel, a Member of the SAF, at an awards ceremony at the Army-Navy Country Club, Washington, D. C. on November 28. He was cited as follows:

Mr. John G. Kuenzel, head of the Bureau's Wood Products Section, has distinguished himself in the Bureau's wood development program. Under his direction wood laminates have been developed for shipboard and other extreme exposure uses; ways of using plentiful species of domestic woods heretofore considered unsuitable for ship and boat construction have been realized; the causes of and means of preventing deterioration of wood in ships and boats have been investigated and clarified with the result that such vessels can be assured maintenance service life at least equal to similar steel-hulled ships. Further, Mr. Kuenzel's contributions have enhanced cooperation and understanding between the Navy and the wood industry.

Brown Heads Texas Tree Improvement

Claud L. Brown has been named to head the forest tree improvement program in Texas, Dr. A. D. Folweiler, director of the Texas Forest Service, announced in January. Brown was silviculturist in the Research and Education Department at College Station at the time of his appointment. He replaces Dr. Bruce J. Zobel who resigned to accept a position with North Carolina State College. Although the program is administered by the Texas Forest Service, it is financed jointly by the Texas Forest Service, Texas Agricultural Experiment Station, and 11 units of forest products industries.

A graduate forester, Brown holds a master of science degree in plant physiology and will secure his doctorate in biology during 1957.

Brown was previously employed by the Georgia Forestry Commission and the Longleaf Lumber Co. in Georgia. He served with the U. S. Navy in the South Pacific from 1944 to 1946.

THE LOWTHER TREE PLANTER PLANTS 10,000 SEEDLINGS PER DAY!

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Three distinct models available to cover all soil conditions and terrain.

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On decking operations, the HD-6 has the power to cut costs and operational time.

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52 drawbar hp • 5 speeds to 5.5 mph
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In the woods or at the mill, the Allis-Chalmers HD-6 crawler tractor easily handles tough dozing and skidding jobs.

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SOUTH'S LARGEST CHAIN SAW MANUFACTURER

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Fahnestock Transfers to Southern Experiment Station

George R. Fahnestock, fire research forester of the U. S. Forest Service, has transferred from Missoula, Mont. to Alexandria, La. He has been in charge of fire behavior research at the Intermountain Forest and Range Experiment Station Fire Research Center at Missoula. He will serve as assistant chief of the Division of Fire Research of the Southern Forest Experiment Station with headquarters at a newly organized forest fire laboratory at Alexandria.

Fahnestock graduated from the University of Cincinnati in 1936 and received his Master's Degree in Forestry from Yale University in 1938. Prior to assignment to fire research in 1951, he was a district ranger on the Gallatin and Flathead National Forests. He entered the Forest Service in 1938. During World War II he was an officer in the U. S. Navy with most of his service aboard a destroyer in the Pacific Fleet.

Smokey Bear Goes International

Smokey Bear has gone international the U. S. Department of Agriculture announces. A cooperative agreement between the Forest Service and the Canadian Forestry Association has been signed which makes Smokey the official forest fire prevention symbol in Canada as well as in the United States.

The Association of State Foresters, which works with the Forest Service and The Advertising Council in conducting the nation's forest fire prevention program, authorized this agreement. Application to have the Smokey Bear symbol copyrighted in Canada has been made to the Canadian Trademark Office. In the United States the Smokey symbol is protected by an Act of Congress.

Director J. L. Van Camp of the Canadian Forestry Association expects the Smokey Bear Program to have as great an appeal in Canada as here. Edward Cliff, assistant chief of the Forest Service, in signing the agreement said he thought both the United States and Canada would benefit from combining efforts and concentrating on a single campaign.

Both countries will use the same or similar fire prevention messages. Methods, materials, and means of presentation shall also be similar, according to terms of the agreement.

Herbert Heads Michigan Economic Research Department

Paul A. Herbert, who recently retired from the position of director of the Division of Conservation, Michigan State University, East Lansing, has accepted an appointment as director of research for the Michigan Economic Development Department.

Herbert first became head of the Department of Forestry at Michigan State in 1930 and was subsequently named director of the Division of Conservation when it was organized following World War II. He is a veteran of both World Wars and is widely known for his work as an educator and for his activities and interests in the fields of economics and renewable resource management.

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a dependable source
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Private & Industrial

Two Timber Journals Combine Facilities

The *Timberman* and its affiliated publication, *Western Building*, have been sold to Miller Freeman Publications, publishers of the *Lumberman*.

The new *Timberman* will deal entirely with material on forest management, logging, and log transportation. The *Lumberman's* subject field will be lumber manufacturing, plywood, panel board, and wood products.

Edgar P. Hoener, president of the *Timberman*, will serve as publisher and general manager of the publications. William E. Crosby, editor of the *Lumberman*, will become editorial director of both the *Timberman* and the *Lumberman*. Dean F. Sherman and Albert Arnst, managing editors of *Timberman* and *Lumberman* respectively, will remain in those positions as editors.

More Trees . . . Better Stands

NEW DRUG HELPS CONTROL DAMPING-OFF. GIVES AS MUCH AS 100% PROTECTION

The drug that has proven so highly and uniformly effective is SUNOX. College tested and field proven over a period of years, SUNOX is now widely used as a standard procedure in preventing Rhizoctonia-caused diseases. A soil fungus, Rhizoctonia solani, ranks as a major agent of damping-off in seed beds and in cutting benches. It attacks liners in the field and mature plants and shrubs in the home-owner's garden.

"We applied SUNOX in a test for control of pre-emergence damping-off on both black and white spruce. Damping-off killed 75% of the seedlings in the control bed, 50% in the recommended treatment and less than 10% in double the recommended measure," reported a large grower in the Mid-west.

"A marked reduction in the mortality of the small trees was noticed immediately after application of SUNOX," another large grower in the South reported. "We made three applications on the affected areas with significantly good results."

ECONOMICAL!

1 lb. of SUNOX makes 320 gallons of treating solution at a cost of 2c per gallon and less. 1 gallon will treat 8 sq. ft. of rooting medium or 4 sq. ft. in the field. Write for prices and literature.

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P.O. Box 205 LODI, N. J.

4-H $1,600 Award Announced by Homelite

Four new $1,600 forestry scholarships for 4-H members have just been established by Homelite, Port Chester, New York.

The four year scholarships are to be awarded for achievement in forestry, with one scholarship to be awarded for each of the four 4-H regions. The entire program will be administered by the National Committee on Boys' and Girls' Club Work and judging of the winners will be made by this committee. Each scholarship winner will receive $1,600 toward his college tuition or living expenses at the rate of $400 for each of four years.

Chemical Company Awards Fellowship

The Chapman Chemical Company Graduate Research Fellowship was awarded to William C. Kelso of Memphis, Tenn., it was announced by the University of Minnesota School of Forestry. Research under this fellowship is directed towards basic problems relating to the use of pentachlorophenol as a wood preservative.

The award is sponsored by the Chapman Chemical Company of Memphis, Tenn.

Mr. Kelso received his B.S.F. from Louisiana State University in 1949 and his M.F. from Yale University in 1951. He has had six years of experience in the wood preservation field.

Research on this project will be under the direction of Frank H. Kaufert, director of the School of Forestry.

Tree Farm Program Continues Growth

The 16-year-old industry-operated American Tree Farm System gained 3,709,310 acres in 1956, reaching a total of 41,548,217 acres in 44 states.

The 10 percent increase in enrolled acreage was announced by C. A. Gillett, managing director of American Forest Products Industries, Inc., Washington, D. C., the national Tree Farm sponsor.

Florida took over national leadership with 4,290,800 acres and became the first state to pass the 4 million-acre mark. Other leaders are Georgia, 3,824,674 acres; Oregon, 3,667,778; Alabama, 3,614,041; Texas, 3,431,304; Arkansas, 3,405,081; and Washington, 3,374,033.

Mississippi continued to lead in number of Tree Farms certified, being first to reach the 1,000 mark in November. Texas followed with 914 Tree Farms; Alabama, 727; Arkansas, 601;

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Permits screwing can direct to gun — eliminates funnels, canteens and sloppy paint transfers.

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Saves hours wasted in stirring — makes marks that endure and *twice as many per gallon.*

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Forest Management and Logging plans. Locations for Wood industries.

POMEROY & McGOWIN

FOREST MANAGERS

Monticello, Arkansas Chapman, Alabama

Idaho, 593; Minnesota, 508; Michigan, 432; and Ohio, 419.

New states in which Tree Farm programs were launched during the year were Connecticut, Vermont, New York, and Indiana.

Education

Hungarian Forestry School Immigrates to British Columbia

In January the faculty and student body of the Department of Forestry, Technical University at Sopron, Hungary, immigrated to Canada. In the group were said to be 24 faculty members, 191 students, and 75 dependents. Their destination is Powell River, British Columbia, where the Powell River Company has prepared accommodations for them. They are taking an intensive course in English.

Beginning in May the students will be given employment in woods work. If living accommodations are available, the group will move to the University of British Columbia in September to continue their forestry studies under their own faculty, and subsequently obtain a degree in forestry under the auspices of the University. The dean of the Hungarian forestry faculty is Kalman Roller, whose address is in care of the Powell River Company, Powell River, B. C., Canada.

Dean George S. Allen of the Forestry Faculty, University of British Columbia, reports that contributions of books and other supplies will be gratefully received. Readers of the JOURNAL who desire to contribute to this worthy cause should just write to Dean George S. Allen, Faculty of Forestry, University of British Columbia, Vancouver 8, B. C., Canada.

Donald P. White Joins Michigan State Faculty

Dr. Donald P. White recently was appointed associate professor of forestry at Michigan State University.

A graduate of the State University of New York College of Forestry at Syracuse University, where he received the B.S. degree in 1937, White received the M.S. and Ph.D. degrees at the University of Wisconsin in 1940 and 1951 respectively.

Before going to Michigan State, he was assistant professor of silviculture at State University of New York, a research assistant in the soils department of the University of Wisconsin, and a forester with the Bureau of Indian Affairs in Arizona.

Fulbright Scholar Joins Faculty At LSU Forestry School

The appointment of Dr. Francis R. Moulds of Victoria, Australia, as visiting professor and visiting forester in the School of Forestry at Louisiana State University for the spring semester has been announced by Dr. Paul Y. Burns, director of the School.

Dr. Moulds will be on leave from his position as principal of the Victorian School of Forestry at Creswick while filling this position. He was awarded a Fulbright travel grant for teaching and research at the LSU School of Forestry.

Dr. Moulds received his Master's and Ph.D. degrees from Yale University, and has since been engaged in teaching and administrative work in forestry in Australia. His undergraduate work was done at the Victorian School of Forestry and the University of Melbourne. He is a member and past president of the Victorian Foresters' Association and a member of the Institute of Foresters of Australia. He has published widely in the fields of forest economics, forest genetics, and silviculture.

Southern Regional Graduate Summer Sessions in Statistics

The fourth Southern Regional Graduate Summer Session in Statistics will be held from June 12 through July 20 at the Virginia Polytechnic Institute, Blacksburg, Va. The three previous sessions were held at the Virginia Polytechnic Institute, the University of Florida, and North Carolina State College in that order. In 1958 the summer session will be held at Oklahoma Agricultural and Mechanical College.

The summer sessions, designed to carry out a recommendation of the Southern Regional Education Board's Committee on Statistics, will be of particular interest to (1) research and professional workers who want intensive instruction in basic statistical concepts and who wish to learn modern statistical methodology, (2) teachers of elementary statistical courses who want some formal training in modern statistics, (3) prospective candidates for graduate degrees in statistics, (4) graduate students in other fields who desire supporting work in statistics, and (5) professional statisticians who wish to keep informed of advanced specialized theory and methods.

The faculty for the 1957 session at the Virginia Polytechnic Institute will

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INDEX TO ADVERTISERS

	Page
Allis-Chalmers	251
Atkinson, S. Gayley	255
Banzhaf & Co., George	254
Bartlett Mfg. Co.	240
Belanger & Bourget	254
Caterpillar Tractor	Third Cover
Clark, Thomas G.	255
Clifton, Thomas C.	255
Cranston, Keith	254
Eastman, Wm. A. Jr.	255
Fechheimer Bros. Co.	252
Forest Seeds of Calif.	252
Forestry Suppliers, Inc.	249
Hale Fire Pump	248
Hall, Albert G.	255
Hall, Jack M.	255
Hammon, Jensen & Wallen	254
Hazard, James O.	250
Health Survey Consultants, Inc.	244
Homelite Corp.	Back Cover
Keene Forestry	250
Koppers Co., Inc.	178
Kurfew, Inc.	244
Lemieux, Frank	255
Lind Co., A. L.	252
Lowther Co., Harry A.	250
McCulloch Motors Corp.	235
McCurdy Bros., Nurseries	250
Meadows, Ben	238
Melin Meteorological Service	250
Midvale Chemical Co.	253
Motorola	241
Musser Forests	239
Nelson Co.	239
Nelson Company, The	253
Northeast Forestry Service	255
Northern Tree Co.	255
Osmose Wood Co.	242
Panama Pump Co.	250
Pomeroy & McGowin	254
Pond & Moyer	255
Poulan Chain Saws	252
Prentiss & Carlisle, Inc.	255
Price, William H.	255
Reuel Little Tree	236
Rich Fire Tool	244
Rootspred	247
Ryker, Inc., Harrison C.	250
Sandvik Steel, Inc.	239
Schultz & Co., C. D.	248
Sebrell, Corp., J. B.	244
Sewall Co., J. W.	255
Silva, Inc.	244
Smith Co., D. B.	2nd Cover
Southern Coatings	246
Southern Seed Co.	252
Stock, John W.	255
Sunerest Evergreen	240
Timber Mgmt. Service	255
Tree Farm Mgmt. Service	255
Walpole Co.	247
Western Fire Equipment	242
Weyerhaeuser Tbr. Co.	245
Whitmire Research Lab.	237
Wiley, John & Sons	243
Winslow, Paul T.	255

include Evan J. Williams, principal research officer, Commonwealth Scientific and Research Organization, Division of Mathematical Statistics, Melbourne, Australia; Daniel B. DeLury, director of statistics, Ontario Research Foundation, Toronto, Canada; J. L. McHugh, director, Virginia Fisheries Laboratories, and the following staff members from the Virginia Polytechnic Institute: Willard O. Ash, L. S. Brenna, Ralph A. Bradley, C. W. Clunies-Ross, John E. Freund, Rudolf J. Freund, Boyd Harshbarger, Clyde Y. Kramer, and R. Lowell Wine.

The total tuition fee will be $38.00 for the six-week term. Doctoral courtesy will be offered to those holding doctoral degrees.

Inquiries should be addressed to Boyd Harshbarger, head, Department of Statistics, Virginia Polytechnic Institute, Blacksburg, Va.

Forest Genetics Assistantships North Carolina State College

Effective September 1, 1957, research assistantships will be available in the field of forest genetics and closely related fields such as forest physiology. Assistantships are granted on a 12 months basis, and are available to students studying either for the Master's degree or for the Ph.D.

The Assistantships will be $2,000 annually on the Master's level and $2,400 annually on the Ph.D. level. Research assistants are not required to pay out-of-state tuition.

Applications should be made at an early date. Announcements of the recipients will be made on or about April 1, 1957. The effective date will be September 1, 1957.

Student research will be of a basic supporting nature to some phase of the cooperative industry-school forest genetics research program at N. C. State College. This research program is under the direction of Dr. Bruce Zobel and R. L. McElwee. It deals with various types of forest genetics research and application, with emphasis on wood properties.

For further information, address inquiry to Dr. Bruce Zobel, School of Forestry, N. C. State College, Raleigh, N. C.

Equipment & Supplies

Caterpillar Adds New Feature

A new feature designed to aid the machine owner in recording accurate job data has been recently announced by Caterpillar Tractor Co.

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Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

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Box K, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B. S. F., and M. S., Forest Entomology. Age 38. Single. Six years forestry experience, including aerial photo interpretation and mapping, land appraisal, timber cruising, forest planting, forest management, and forest pest control. Desire position offering opportunity in forest entomology, timber management, or learning forest tree nursery management.

Box L, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., University of Mass. 1954. Age 25. Married, one child; veteran. Presently studying for M.F. degree in forest management at Duke University. Available June 1957. Experience limited to U. S. Forest Service summer employment. Desire location in Northeast, but will consider others.

Box M, Journal of Forestry, Mills Building, Washington 6, D. C.

B.S.F., N. C. State. Age 37, married, one child. Five years diversified and intensive experience in Southeast. No traveling; want conservation or management work in Southeast or Northeast; preferably private holdings or any related field offering opportunity for advancement and varied work. Now employed.

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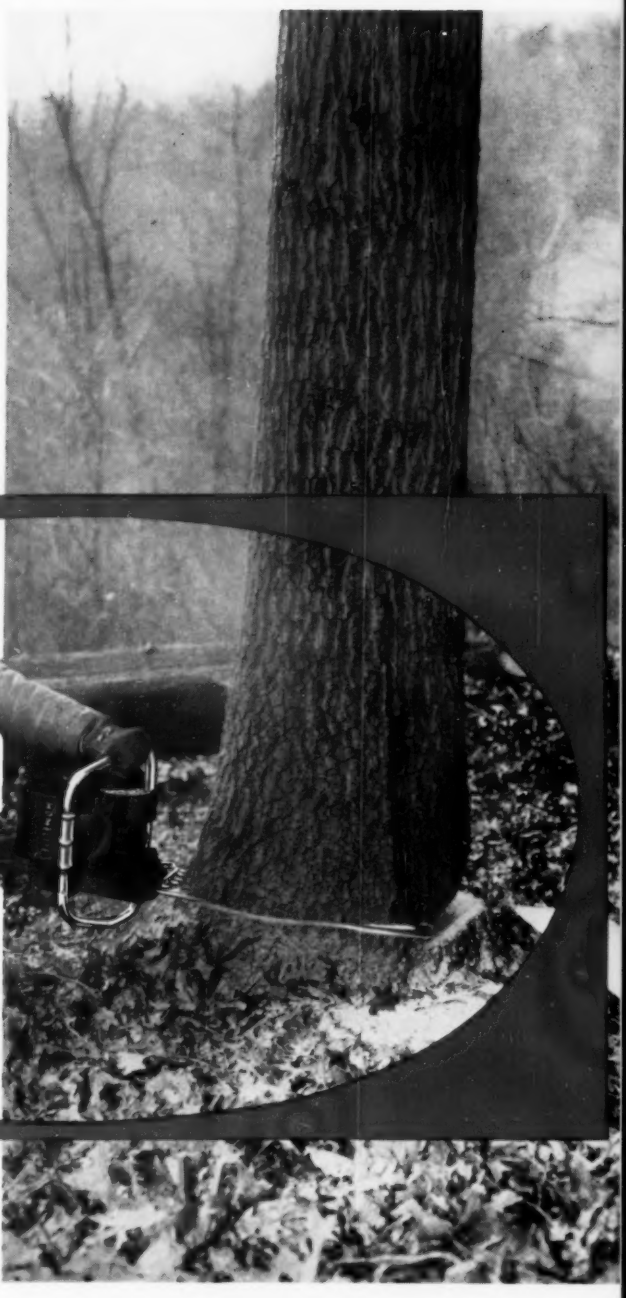

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